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# **Analysis of the Technology of the Sports Model Flying Disc and Associated Topics**



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### **About the front page illustration**

The front-page illustration is the result of an attempt that was made by the author around 1962-63 as a teenager to debunk George Adamski's infamous "chicken brooder" flying saucer, using available scrap items, a mirror reflex camera and classic darkroom image processing. This was before the age of personal computers and digital image processing.  
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## 1 Introduction

### 1.1 Purpose

This document presents an analysis of the so-called “Sports Model” flying disc, which is stated by Robert Scott Lazar (commonly known as Bob Lazar, and used hereafter in this report) to be held in custody by the US Air Force at a secret location known as “Site-4” (short: S-4) near the well-known and highly hyped “Area 51” in Nevada, USA. Area 51 is a highly classified facility located within the Nevada Test and Training Range near the Groom Lake salt flat and the U.S. Air Force Homey Airport (ICAO airport identifier code: KXTA).

The present analysis is based on information in the public domain, and this information is held up against current physics and technology in an attempt to try to understand the operation of the “Antigravity Reactor”, which is the propulsion system of the Sports Model flying disc as purported by Bob Lazar. The same propulsion system applies to the other eight alien spacecraft held by US Air Force at S-4, again according to Bob Lazar.

### 1.2 Scope

It should be emphasized that this document is **not** a cheap attempt to debunk the existence of one or more alien spacecraft held in custody by the US Air Force, and **not** a cheap attempt to debunk the feasibility of a “Gravity Warp Drive” based on the antigravity reactor described by Bob Lazar. The intention is to use current state-of-the-art nuclear physics and technology to thoroughly analyze the purported mode of operation of the antigravity reactor based on information conveyed directly or indirectly by Bob Lazar in public domain sources.

Topics **outside** the scope of this report include:

- The three videos showing Unidentified Aerial Phenomena (UAP) released by the US Department of Defense on 2020-04-27, [1], [2].
- The report entitled: “Preliminary Assessment: Unidentified Aerial Phenomena” published 2021-06-25 by the Office of The Director of National Intelligence, [3].

Even if outside the technical domain, the life and works of Bob Lazar in general is tightly intertwined with the purported work at S-4. Therefore, this report is opened with a chapter about the Bob Lazar biography.

### 1.3 Sources of Information

There are eight main sources of information for the life and works of Bob Lazar, his timeline and the design and operation of the Sports Model flying disc:

1. “Bob Lazar: Area 51 & Flying Saucers”, a documentary movie directed by filmmaker Jeremy Kenyon Lockyer Corbell (shorthand: Jeremy Corbell) focused on the claims of Bob Lazar that he reverse-engineered alien spacecraft for the US military at a secret facility named S-4 (near Area 51), [4]. A list of highlights and partial transcripts of this movie is included in Appendix A.
2. Interview with Bob Lazar (and filmmaker Jeremy Corbell) by Joe Rogan, in #1315 of the “Joe Rogan Experience” podcast series, dated 2019-06-21, [5]. A list of highlights and partial transcripts of this interview is included in Appendix B.
3. Interview with George Knapp, KLAS-TV, Las Vegas, dated 2019-11-08 on YouTube, but is actually based on material broadcast in November 1989 after Bob Lazar went public (although anonymous) with his story in May 1989 also on KLAS-TV, [6]. A list of highlights and partial transcripts of this interview is included in Appendix C.
4. Interview with filmmaker Jeremy Corbell in episode 13 of the Danish podcast series “Flyvende tallerken” (Flying saucer), by Danmarks Radio (Danish Broadcasting

Corporation), Episode 13 is entitled: “Historien om Bob Lazar” (The Bob Lazar story), [14]. Most of this podcast is in English, but there are intermezzos during which the podcast hosts discuss the interview in Danish. This reference is a key to understanding the story of the “Hand scanner” used at S-4 for authenticating the staff before being allowed into the facility. See also Appendix H.

5. A report by Kenneth F. Wright entitled: “GRAVITY WARP DRIVE, Making Star Trek a Reality!, Supporting Documents”, [7].
6. The website <http://www.boblazar.com/>, [11]. This domain is registered by Jon Farhat Inc., California, USA, and contending to convey the true story of Bob Lazar.
7. The Bob Lazar timeline as presented by Thomas Louis (Tom) Mahood, [17], [18].
8. “The Lazar Synopsis” by Gene Huff, dated March 12, 1995, [100].
9. The YouTube video “The Lazar Tape and Excerpts from the Government Bible”, [138].

**Re 5:** Kenneth F. Wright also published a report entitled: “A Field Theory Demonstrating The “Strong Nuclear Force” and Gravity Are One and the Same Using Quantum Mechanics Newton’s Law of Gravity and Einstein’s General Theory of Relativity” (GR), [8], and an accompanying slide show entitled “Nuclear Gravitation Field Theory – Update”, [9]. This theory is not directly related to the work of Bob Lazar, but as it deals with gravity and also the properties of element 115 Moscovium and other elements, and purports some incorrect physical claims, the theory is commented in Appendix G. Reference [10] seems to be the first published version of the “Nuclear Gravitation Field Theory”, [8], and is dated May 10, 1999, which may be important in the perspective of the Bob Lazar timeline. The concept of gravity and “gravity as a wave” purported by Bob Lazar has many similarities to Kenneth F. Wright’s Nuclear Gravitation Field Theory.

**Re 6:** The illustrations on the referenced site seems to be the source of some of the illustrations in reference [7]. The structure of the website is unusual, as it is just one big JPEG image whose metadata tells that it was created on July 12, 2014. The relation between Jon Farhat and Bob Lazar is not revealed, but the very professional look of the illustrations probably owes to Jon Farhat being a motion picture visual effects supervisor and interested in the Bob Lazar story. There are some hints of the relation between Bob Lazar and Jon Farhat in [12] and [13], with an artwork: “Bob Lazar in East Reticulum” and a statement in [13], which reads: *“Bob is my friend. I’ve known him and loved him as a brother for over 30 years. He told the truth then and now evidence proves he was right all along. This rendering is number two in a series of portraits of Bob. His sense of humor is appreciated”*. What is in number one portrait of Bob Lazar is not revealed.

**Re 8:** This source of information was only discovered very late in my investigation, but it is extremely interesting and relevant. Gene Huff is apparently a longtime friend of Bob Lazar, and in his synopsis, as he denotes his narrative, he gives a wealth of detail on the Bob Lazar story, much more than Bob Lazar himself and any other of the references listed above, except maybe item 7. As a friend of Bob Lazar, Gene Huff’s style of writing is obviously much more inclusive of the events than the timeline given by Tom Mahood, item 7, who maintains a style of scrutiny. The level of detail rendered by Gene Huff about the events leading up to Bob Lazar’s engagement at S-4, and the events leading to his dismissal is impressive, and it is hard to reject this as a fabrication.

For general, tutorial style information, Wikipedia, [www.wikipedia.org](http://www.wikipedia.org), has been used extensively, as Wikipedia articles give good, reliable overviews of a topic and include references to original sources of information. Scientific papers are referenced wherever research results are specifically needed.

The searches and queries performed for retrieving articles and papers for this analysis has been thorough but not exhaustive. Therefore, it is very certain that there is much more material

in the scientific databases about the topics dealt with in this report. However, having retrieved both very new and older material and having checked the references herein, it is deemed most likely that pertinent research results have not been overlooked.

Queries for material about Bob Lazar himself yields overwhelming numbers of hits. A Google search of “Bob Lazar” (verbatim): 672000 hits, Bob Lazar (just the two words): >4 million hits. Therefore, it is 100% sure that I have only scratched the surface of the phenomenon “Bob Lazar”. However, I am not going to spend the rest of my life researching him. I will stop here.

**Re 9:** I only became aware of this video, ref. [138], very late in my investigation. This video is a schoolmaster style lecture about the antigravity drive of the Sports Model flying disc and the “physics” behind it, produced by Bob Lazar and Gene Huff, who also appears in section 2.7.

## 1.4 Organization and Structure of the Report

Literature references are given as a number in square brackets, e.g. [1]. References relating to an appendix use the same format, but the number is preceded by the appendix letter and a dash, e.g. [A-1].

References used in chapters 1 through 5 are listed after the abbreviations list, while references specific to the appendices are listed at the end of each appendix.

Chapter 2 of this report is an analysis of the Bob Lazar biography. Even if this does not deal with the purported technology of the “Sports Model” flying disc, the life and work of Bob Lazar is intimately intertwined with his claims of doing reverse engineering at S-4 of the propulsion system of this flying disc. This chapter is partially written in a “first person” style at this was judged to be the most appropriate format.

Chapter 3 describes and comments on the overall design of the Sports Model flying disc based on public material and the interviews with Bob Lazar in references [4] – [7], [11]. This chapter and the rest of the report with a few exceptions is written in the usual scientific report style.

Chapter 4 analyses of the propulsion system of the “Sports Model” flying disc as described by Bob Lazar based on references [4] – [7], [11].

Abbreviations and acronyms are listed after the main chapters.

Nine appendices deal with details of specific aspects of the analysis including highlights and transcripts of the Bob Lazar movie, videos and applicable podcasts.

## 1.5 Reading Guidelines

It is strongly recommended for the full appreciation of this report that the reader in advance watches the Bob Lazar movie, [4], listens to the podcasts and YouTube videos, [5], [6], [14] and [138], and consults the web-links referenced in section 1.3.

## 1.6 Notes about the Author

The author holds an MScEE (1973) and PhD degree (1984) in digital and satellite communication from the Technical University of Denmark. The author has 34 years of experience within space technology, space environment, satellite communication and satellite navigation.

The author is thus not a nuclear physicist, but in the days of his MScEE study, a very comprehensive curriculum of mathematics, physics, thermodynamics, basic nuclear physics, optics and statistical mechanics was taught. Therefore, with a reasonable effort the author thinks he has established an adequate foundation for an assessment of the alleged antigravity drive of the Sports Model flying disc.

## 2 Bob Lazar Biography

### 2.1 Introduction

Robert Scott Lazar, commonly known as Bob Lazar, is a very controversial figure in the UFO community, and his life is to a great extent shrouded in mystery. He claims to have worked at the secret site “S-4” (cf. sec. 1.1), reverse engineering an alien spacecraft propulsion system during the period December 1988 to April 1989.

He claims to have university degrees in physics from California Institute of Technology (CalTech) and Massachusetts Institute of Technology (MIT).

He claims to have worked as a scientist at the Los Alamos Meson Physics Facility (LAMPF) at the Los Alamos National Laboratory (LANL) before he joined S-4.

However, it has been questioned if he is actually a physicist with a university degree, it has been questioned if he actually worked at LANL before he was hired to reverse engineer an alien spacecraft, and if he is actually the person he pretends to be.

To delve into these matters is the purpose of this chapter.

I first learned about Bob Lazar many years ago, when I stumbled upon an article about a spectacular accomplishment in the early life of Bob Lazar: His jet-powered Honda Civic car dating to the early 1980'ies. I was impressed by the guy's bold approach to car propulsion, but did not otherwise pursue the topic, and did not at that time learn about his purported work with alien spacecraft at S-4.

My next experience with Bob Lazar was the podcast series: “Flyvende tallerken” (Flying Saucer) by Danmarks Radio (Danish Broadcasting Corporation), whose episode 13 was entitled: “Historien om Bob Lazar” (The Bob Lazar story), an interview with filmmaker Jeremy Corbell dealing with the life and works of Bob Lazar, [14]. This podcast presented the “official” story about Bob Lazar and his work at S-4 and the hardships he endured after being caught by security guards while attending test flights of the flying disc together with his friends and family at a vantage point overlooking S-4.

When listening to Bob Lazar's story, he appears as a scientist and talks as a scientist. At least this is the first impression. However, when scrutinizing his story, there is actually not much hard core or high-level science to find. Anyone with a background in physics from high school (In Danish: Gymnasium) and an interest in nuclear physics could easily acquire knowledge at the level demonstrated by Bob Lazar from magazines such as Scientific American and others, as well as popular science physics books.

When viewing Bob Lazar working in the lab of his company United Nuclear Scientific Supplies, [5] from 00:28:15, he appears very experienced with lab work, but this is not a proof that he is a scientist with a university degree. It proves that he has worked a lot with laboratory technician tasks in the lab. Likewise, the extensive inventory of physics and chemistry gadgets in his shop could signal that the owner is a physicist, but knowledge acquired over a lifetime could also be the foundation for creating the range of items for sale.

When doing research to learn more about Bob Lazar, I came about some articles by Tom Mahood, himself a physicist graduated from California State University, Fullerton, [15]. His MSc thesis is available for download, [16], so his academic credentials should be OK.

Tom Mahood has written a well-researched account dated July 1994 of the timeline of Bob Lazar based on public records and updated January 1997, [17]. In 2018 he wrote an addendum with a renewed perspective, [18]. When I first opened these links, I thought that it was just a chronological list of events in the life of Bob Lazar. The reading revealed a very different and hair-raising experience. More about this in the sequel.

## 2.2 The Disappearance of Bob Lazar's Academic Diplomas

A recurrent topic when discussing Bob Lazar is the fact that his birth record and documentation of his claimed academic degrees from California Institute of Technology (CalTech) and Massachusetts Institute of Technology (MIT) are totally absent. This is thoroughly researched both by Tom Mahood [17], [18], TV-reporter George Knapp, [6], and others, and nothing has been found.

Bob Lazar himself claims that these records have been deliberately deleted from public records and the stated universities by a secret agency in an attempt to disqualify him.

Apart from the LANL and S-4 occupations, Bob Lazar is only known to be self-employed as a photo processor, based on the bankruptcy files, [17], [18]. No academic occupations have been revealed by research or claimed by Bob Lazar. After terminating his engagement at S-4 in 1989, there is a gap in his timeline during the 1990'ies except from a few public appearances, [59]. However, Bob Lazar established his company United Nuclear Scientific, probably in the beginning of 2000, judging from the registration date of the corresponding www-domain, cf. section 2.5.

As a Dane, it is truly astounding that a person's birth record, and diploma from various educational institutions and universities could just disappear, as well as employment records (particularly the LANL record), as claimed by Bob Lazar.

I have both my birth record on paper, as well as public school and high school diploma (Danish: Gynnasium/Studentereksamen) and Master's Degree and PhD Degree Diploma from the Technical University of Denmark, all on paper. Also, employment contracts on paper are in my possession. All these documents are obviously photocopied and scanned and stored on several backup media in my possession and also stored on a secure cloud drive. A government intelligence agency attempting to delete my records could possibly accomplish this at the relevant institutions. You could also imagine that secret agents broke into my house, searched it, and removed all compromised documents. They are probably trained in leaving little or no traces, but to find my personal documents and backup media in my house, they would have to ransack every nook and cranny, and I would suspect they could not do this without disordering something. In the 1980'ies a secret agency wanting to delete Bob Lazar's public records would need to remove lots of paper from archives in numerous places. Could this be done ???

I have published a number of scientific papers, mostly co-authored with other scientists. These would document my scientific merits and credentials, and they would not be easy to remove from the web and its databases.

In the principal sources of information listed in section 1.3, Bob Lazar has never claimed that he once had in his possession original paper versions of the diplomas from educational institutions, employment contracts or his birth record.

Breaking into a secure server should be a bigger challenge to a secret agency, but if the rumors about backdoors in common encryption systems are true, a secret agency could probably also gain access to my cloud drive and delete compromised documents. Anyway, even if they were extremely meticulous, I doubt that they could find and delete everything. In addition to my own cloud drive, they must search dozens of servers where copies of my scientific papers would be stored. Even when having accomplished that, there would be paper copies around of my papers, many of which I co-authored together with other scientists. I stick to the assumption that once a piece of information is uploaded to the Internet, it never disappears.

So why don't Bob Lazar have his birth record, university diploma and employment contracts on paper, photocopy, microfilm and/or scanned electronic copies, securely hidden?

The most obvious conclusion based on the research by Tom Mahood is that the highest degree earned by Bob Lazar is an electronic technician, [18], and that his academic records never existed.

### 2.3 Bob Lazar's Employment at Los Alamos National Laboratory

Prior to working at S-4, Bob Lazar, some public domain sources state that Bob Lazar worked at Los Alamos National Laboratory. Bob Lazar's very "innovative" ideas of propulsion of his bicycle and car, manifested in first a bicycle propelled by a small jet engine to 160 km/h (100 mph). Subsequently he installed a larger jet engine with 1600 pound thrust in his Honda Civic car. The jet engine, although throttled to 800 pound thrust, propelled his car to 320 km/h (200 mph) in at test on a dry lake bed near Los Angeles, This takes place up to year 1982 and is reported in an article in Los Alamos Monitor (a local newspaper), Pages A1 and A8, Sunday, June 27, 1982, [41]. This reference is a transcript of the original article (without photos). In reference [41], Bob Lazar is stated to be a physicist at the Los Alamos Meson Physics Facility (LAMPF) at the Los Alamos National Laboratory (LANL). LAMPF was renamed the Los Alamos Neutron Science Center (LANSCE) in 1995.

I have not been successful retrieving the original article in Los Alamos Monitor (which ceased publication in 2020, [43]) even if the Library of Congress seems to have Los Alamos Monitor in their collections, [44]. However, the original newspaper article is displayed in the Bob Lazar movie, [5] at 00:39:05, and in the George Knapp interview, [6] at 00:06:38. An article that is verbatim a copy of the Los Alamos Monitor article and by the same reporter appeared in The New Mexican on July 30, 1982, [42].

The question is: Can the newspaper articles be taken as a proof that Bob Lazar is a physicist? The answer is NO. It is a general experience that journalists often get the position and education of a person wrong, and it cannot be ruled out that Bob Lazar wanted to boost his position to more than a technician by telling the journalist that he was a physicist.

Strange though it is, that no one seems to have found colleagues of Bob Lazar who worked with him at LANL and who were willing to step forward and confirm or disclaim the alleged position of Bob Lazar.

Assuming that Bob Lazar has worked as an accelerator technician at the LAMPF/LANSCE facility, it would naturally allow him to acquire a significant amount of physics knowledge as he would work with physicists every day. Based on his work with a jet-powered bicycle and car, it is obvious that Bob Lazar is a curious and innovative guy.

### 2.4 Bob Lazar's Bankruptcy and Criminal Record

I will not delve very much into Bob Lazar's bankruptcy and criminal record. These topics have already been covered in detail by Tom Mahood, [17], [18].

During the years from about 1984 until Bob Lazar filed for Chapter 7 bankruptcy on July 21, 1986, he took several loans from family and banks, purchased two cars, but he failed to pay the installments. This tells me that he was not in control of his life during this period.

During the same period, he got financially involved with a brothel in Reno, Nevada and seems to have had a good income from this source. On June 18, 1990, this led to a charge for pandering, and Bob Lazar was convicted on August 20, 1990. Again, this tells me that his moral compass was out of calibration.

These events may have nothing to do with his purported work with alien spacecraft at S-4, but they do not strengthen his credibility.

Finally, there is the FBI raid of the premises of United Nuclear, probably in 2018, as it is stated by Jeremy Corbell to have taken place during filming of his movie "Bob Lazar: Area 51 & Flying Saucers", [4], which was released in December 2018. This seems a trivial investigation by FBI, but the case is claimed to be a search for sample(s) of Moscovium which Bob Lazar is said to have stolen at S-4. Details in ref. [137].

## 2.5 Bob Lazar’s Company United Nuclear Scientific Supplies

United Nuclear Scientific Supplies LLC, 125 N. 8th St., Klamath Falls, Oregon 97601, <https://unitednuclear.com/>, (Accessed 2021-07-28), is the name of Bob Lazar’s company. Checking this address by Google Maps and Google Street View does not reveal a company with this name at this address. Instead, the name on the storefront says: Myrna’s Travel Service Inc (Retrieved 2021-10-06).

A search via the EDGAR Company Filings search tools by the U.S. Securities and Exchange Commission, <https://www.sec.gov/edgar/searchedgar/companysearch.html>, did not find any company of this or similar names (Accessed 2021-07-28).

*The EDGAR database provides free public access to corporate information, allowing you to research a public company’s financial information and operations by reviewing the filings the company makes with the SEC.*

However, a search via the National Corporation Directory website (under the U. S. Secretary of State): <https://corporation.directory/quicksearch/company> identified two companies owned by Bob Lazar (Retrieved 2021-07-28):

United Nuclear Scientific Eqpt <a href="#">16429 Upton Road # 1</a> East Lansing, MI 48823	Michigan	(517) 339-3587	Bob Lazar, President
United Nuclear Scientific Supplies LLC <a href="#">45 Eastridge Road</a> Edgewood, NM 87015	New Mexico		Robert Lazar

*National Corporation Directory is the premiere resource for nationwide corporate registration searches in the United States. Our tools offer real-time, simultaneous access to official state databases and proprietary commercial databases of public information. This is a private service used by legal professionals, businesspeople, analysts, journalists, and other researchers.*

No information on the date of founding these companies is listed.

Checking the above addresses by Google Maps and Google Street View does not reveal a company with this name (Retrieved 2021-10-06).

The www-domain [unitednuclear.com](https://unitednuclear.com) was registered on January 11, 2000, but the registrant name is concealed, cf.: <https://www.whois.com/whois/unitednuclear.com>. It is then likely that the two companies listed above were founded around this date.

Another search using the website <https://cage.report/> listing companies with a **Commercial and Government Entity Identification Code (CAGE)**, which is required to do business with the United States government, revealed again Bob Lazar’s United Nuclear Scientific Supplies, <https://cage.report/CAGE/6RQN3>, but now with a third address. The date the business was established, 2012-06-11, may be the registration in the CAGE database, i.e. date of establishing business with the United States government.

In this database there are also some entries with a company named United Nuclear Corp., but these do not seem to have any relation to Bob Lazar’s United Nuclear Scientific Supplies.

The strange thing with his company is that three different addresses are available, one from his website, and two from the National Corporation Directory, cf. above.

When looking up the addresses listed above on Google Maps and using Street View to see the corresponding buildings and comparing that to the scenes of Bob Lazar driving to his shop in the Bob Lazar movie, [5] at 00:28:15, you will find four different cityscapes. Even the official address listed at the United Nuclear website and viewed with Google Street View reveals a completely different house than seen in the Bob Lazar movie. This is a mystery that I have not been able to resolve.

## 2.6 Bob Lazar's Scientific Publication Record

As a purported scientist and having worked with research in nuclear physics at the Los Alamos Meson Physics Facility at LANL, it would be expected that Bob Lazar has published one or more scientific papers. Therefore, I submitted a number of queries to the search facility "Findit" of the Library of the Technical University of Denmark, which has access to the scientific databases Web of Science, Scopus and Google Scholar, [136].

The queries were formatted to search for author = "Lazar" and "Robert" and also included "Scott" or just middle initial "S". Only one record came out with author = "Lazar, Robert". See below:

```
@article{brimkov2017a,  
  author = {Brimkov, Boris and Edmond, Jennifer and Lazar, Robert and Lidický,  
  Bernard and Messerschmidt, Kacy and Walker, Shanise},  
  title = {Injective choosability of subcubic planar graphs with girth 6},  
  language = {eng},  
  format = {article},  
  journal = {Discrete Mathematics},  
  volume = {340},  
  pages = {2538-2549},  
  year = {2017},  
  issn = {1872681x, 0012365x},  
  doi = {10.1016/j.disc.2017.05.014}  
  https://arxiv.org/pdf/1611.03454.pdf
```

As the above paper deals with the mathematical discipline of coloring planar graphs, and the fact that the author Robert Lazar in this paper is affiliated with the Department of Mathematics, Iowa State University, USA, it seems very unlikely that this author should be identical to Robert Scott Lazar.

This is very strange. Any physicist doing research would dream of publishing his or her results.

**Conclusion:** Bob Lazar has **not** published any scientific papers! This could be justified if he worked with highly classified research at LANL in one of their nuclear weapons or national security programs as stated in the Joe Rogan Experience #1315, [5] at 00:01:35, but it is anyway astonishing.

## 2.7 The Flying Disc Test Flights

The test flights of the Sports Model flying disc which Bob Lazar invited his friends and family to attend on a mountaintop overlooking the Papoose Lake / S-4 area certainly marks the turning point of the Bob Lazar story.

Despite the highly compartmentalized working environment at S-4, Bob Lazar knew that test flights of the flying disc were conducted on Wednesday nights. In what may seem a moment of carelessness, Bob Lazar apparently found it entertaining to invite his friends and family to witness these events.

Bob Lazar arranged three "flight parties" in the spring of 1989 on March 22<sup>nd</sup> and 29<sup>th</sup>, and on April 5<sup>th</sup>. In none of the interviews with Bob Lazar does he reveal exactly where they went to watch the test flights.

Tom Mahood in his article "The Robert Lazar Timeline", [17], states that they went to Tikaboo Valley. Taken verbatim, this cannot be true. There is a mountain range between Tikaboo Valley and Groom Lake and Papoose Lake with peaks up to  $\approx 1900$  m altitude and the valley itself is



at 1200 – 1400 m altitude. Probably Tom Mahood is thinking of Tikaboo Peak at 2412 m altitude, which is a popular vantage point for looking into Area 51 / Groom Lake, [20], [21].

Tom Mahood himself made the trek to Tikaboo Peak in 2002 and took a panorama which includes a view of Area 51, [22].

However, Tikaboo Peak is not a perfect vantage point for “spying” into Area 51. Before 1995 two other peaks were popular: Freedom Ridge and White Sides. Figure 2-1 shows the landscape around Groom Lake/Area 51 and specific features. Figure 2-2 shows a view of Groom Lake and Papoose Lake from Tikaboo Peak.

Tikaboo Peak is  $\approx 40$  km from Groom Lake / Homey Airport and  $\approx 51$  km from Papoose Lake, which is only partially visible due to an intervening mountain range. Therefore, very powerful telescopes/telephoto cameras are needed to see any detail. This is demonstrated in ref. [23]<sup>1</sup>, which shows quite detailed photos made by a spotting telescope equipped with two 2x teleconverters and a mirror reflex camera, for an equivalent focal length of 5000 mm.

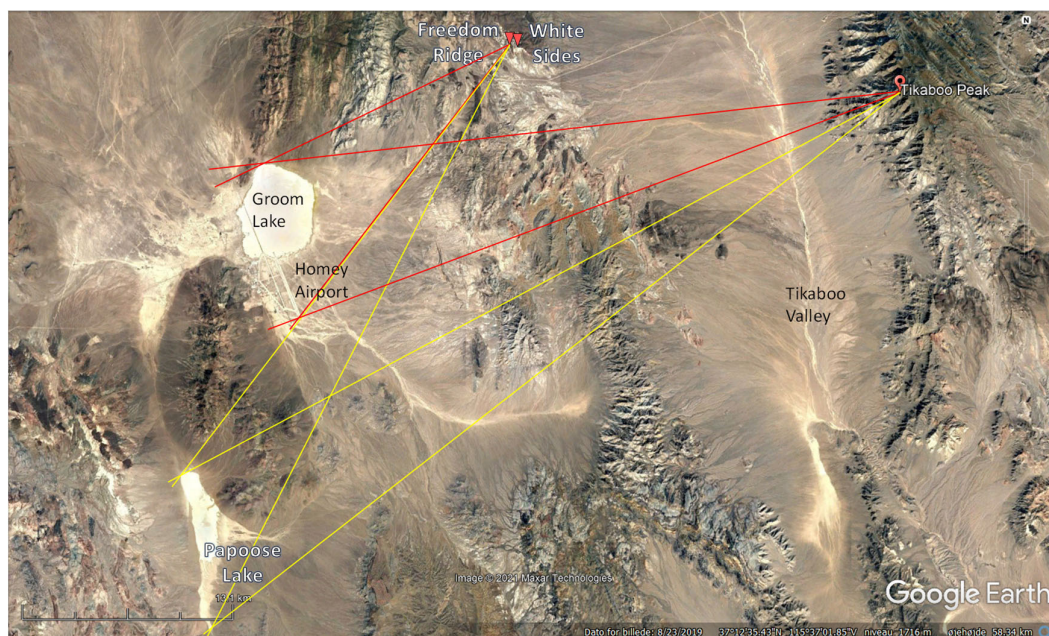


Figure 2-1 Annotated Google Earth view of landscape features around Groom Lake

It should be noted that the topographical map shown in the video with Bob Lazar being interviewed by George Knapp, [6] at 00:05:40, (Appendix C) shows S-4 positioned 10-12 km to the west of the northern tip of Papoose Lake, i.e. just beyond the left edge of Figure 2-1, which is in the Nevada (Nuclear) Test Site. If this is true, yet another mountain range comes in between the vantage points and S-4, and the distances increase by some 10-12 km.

It does not seem likely that S-4 would be located among nuclear test sites. Further, the mountain sides on the east side near Papoose Lake seem much more convenient for concealing the site inside the mountain and the hangar doors just looking as 30° sloped mountain sides as claimed by Bob Lazar, [4] at 00:06:55.

<sup>1</sup> References [21] to [24] are from the website [www.dreamlandresort.com](http://www.dreamlandresort.com). However, Dreamland Resort is not a usual holiday resort, but a nickname for Area 51.



Figure 2-2 Google Earth view of Groom Lake and Papoose Lake from Tikaboo Peak

Freedom Ridge and White Sides, as evident from Figure 2-1, are much closer to Groom Lake than Tikaboo Peak. However, in 1995 security considerations urged the military authorities to “grab” the land around these popular vantage points and prohibit public access, [20].

Figure 2-3 shows the two Peaks. This view is almost identical to the fourth photo of ref. [24].

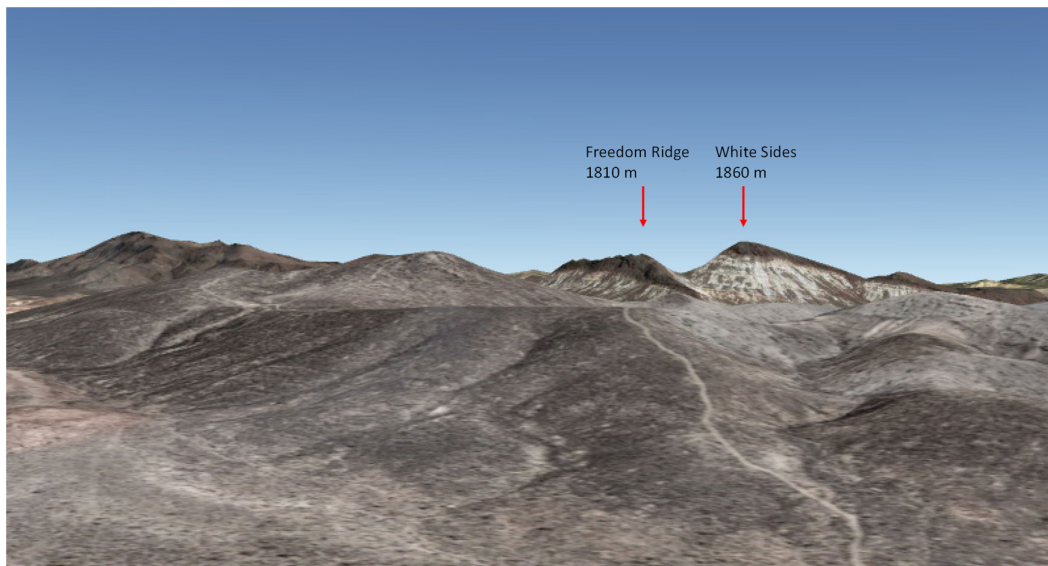


Figure 2-3 Google Earth view of Freedom Ridge and White Sides

The distance from Freedom Ridge / White Sides to Groom Lake / Homey Airport is  $\approx 21$  km (to the middle of the runway) and to Papoose Lake  $\approx 35$  km (to the middle of the lake). However,



Papoose Lake is only partially visible due to an intervening mountain range with peaks up to  $\approx 1600$  m altitude, cf. Figure 2-4.

### **But where did Bob Lazar and his party go in March/April 1989 to view the test flights?**

The entire area around Groom Lake and Papoose lake is very rugged with only few roads, and access restrictions makes it hard to find good, accessible vantage points. Freedom Ridge and White Sides were probably the easiest places to go.

Arguments against Tikaboo Peak: The access is challenging, a one-mile climb over very rugged terrain to the peak from the parking area, [21], [24]. Why would security guards care about Tikaboo Peak, when the distances to the classified areas are so large? In darkness, access is virtually impossible without headlights, or, more likely for security personnel: Night vision goggles.

Therefore, let's assume that the Bob Lazar party went to Freedom Ridge.

Very late in my research for this report I came about the so-called "The Lazar Synopsys" by Gene Huff, dated March 12, 1995, [100]. In this comprehensive, personal account of the Bob Lazar story, Gene Huff, who claims to have been with Bob Lazar on the three nights observing the disc test flights gives some information on where they went, but he does not name a specific location or locations. For the March 22 event, Gene Huff states that: "*He [Bob Lazar] had decided to take me to the desert out off of the now infamous highway 375 to witness a disc flight test*". Going by highway 375 to watch the test flights would be natural if they intended to go to Freedom ridge or White sides, as the road leading past these two vantage points branches off highway 375 in Tikaboo Valley between the towns of Crystal Springs and Rachel. It should be noted that the mention "*infamous highway 375*" refers to the name "Extraterrestrial Highway" given to highway 375 in UFO lore: <https://travelnevada.com/road-trips/extraterrestrial-highway/>.

The next Wednesday March 29, Gene Huff states that they went by Groom Lake Road. This seems very strange. If you look up Groom Lake Road on Google Earth, you will discover that its eastern end is right in the heart of the Groom Lake complex, and riding west will take you past the northern outskirts of the Nevada (Nuclear) Test Site. This is in the middle of Area 51 and inaccessible to civilians, so to me it does not make sense. There is no obvious extension of Groom Lake Road towards the east. I presume that the party came in from the Las Vegas area via Interstate 93 and turned off to highway 375 in Crystal Springs.

There is one very interesting comment by Gene Huff about the March 22 event: "*Soon we saw a bright light rise above the mountains which were between us and S4*". This would be the case if they observed the test flight from Freedom Ridge or White Sides as discussed above.

On the last night, April 5, Gene Huff makes no mention of the location, but he states that they were chased on the road by security guards and, in the end, had to stop and explain themselves. The only clue to the location given by Gene Huff is the statement: "*We went back up to the highway (375?), but we didn't leave*".

The chain of events rendered by Gene Huff is in direct contradiction with the story conveyed by Bob Lazar himself. He claims that they were caught by security guards in pitch darkness, who only revealed themselves because they inadvertently dropped a night vision goggle and Bob Lazar saw the green light from its screen, [5] at 00:54:40.

### **And where did Bob Lazar look to see the test flights of the disc?**

All the way through the Bob Lazar story, S-4 is supposed to be located somewhere in the area around Papoose Lake, built into a mountain side and camouflaged to appear as the mountain side. Taking a thorough look with Google Earth, zooming in on the landscape, cannot confirm any human-made structures. There are only a couple of (dirt?) roads in the area and no other signs of human activity. Of course, one may suspect that the Google Earth imagery is

manipulated in this area, if the military authorities wish to hide something, but if this is the case, the retouching has been very cleverly done. However, looking at the Groom Lake / Homey Airport area in Google Earth, a wealth of detail is seen. The same goes for OpenStreetMap, <https://www.openstreetmap.org>, which although without satellite imagery, also displays a wealth of detail in the Groom Lake area, but very little in the Papoose Lake area. As Groom Lake is a highly classified area, and the Google Earth imagery does not seem to be manipulated, why should the area around Papoose Lake then be manipulated?

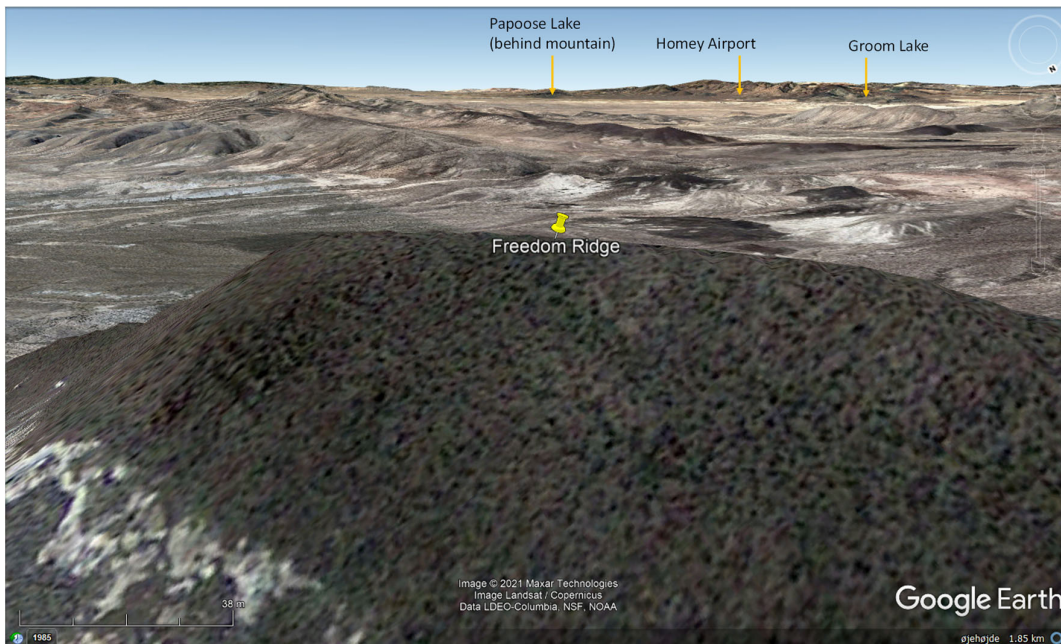


Figure 2-4 Google Earth view of Groom Lake and Papoose Lake from Freedom Ridge

Table 2-1 shows the location data for the three vantage points mentioned above. The position data can be pasted directly into the search field of Google Earth. Google Earth already knows Tikaboo Peak, Groom Lake, Homey Airport and Papoose Lake.

Table 2-1 Location data for Tikaboo Peak, Freedom Ridge and White Sides

Vantage Point	Altitude	Position	Distance to Groom Lake / Homey Airport	Distance to Papoose Lake
Tikaboo Peak	2412 m	37° 20' 39.04" N 115° 21' 31.78" W	≈40 km	≈51 km
Freedom Ridge	1810 m	37° 22' 05.66" N 115° 37' 58.32" W	≈20.5 km	≈35 km
White sides	1860 m	37° 22' 06.50" N 115° 37' 41.50" W	≈21 km	≈35 km

Groom Lake	1345 m
Homey Airport	1365 m
Papoose Lake	1384 m

**The next question is then: Was it dark on the three nights of test flight, and how was the weather conditions?**

On one of the nights of test flights, the party brought a video camcorder to record what they saw. In the late 1980'ies the SONY Hi 8 format and the VHS-C format of compact video tape cassettes and camcorders were introduced at consumer level pricing, [26], [27]. Such cameras typically had a zoom lens with up to 12x zoom factor, [28]. It is therefore assumed that a camera of this type was used for the recordings. The 12x zoom will be a poor match to the 5000 mm focal length telescope/camera setup for the images from Tikaboo Peak of Groom Lake / Homey Airport, [23]. Therefore, what you would expect to see on the movie shot by the Lazar party would only be some tiny patches of light bouncing around.

The video recorded on the night of March 29 is timestamped 8:30 pm (20:30), according to Tom Mahood, [17]. This can also be verified in the Bob Lazar Movie, [4] at 01:04:30 and onwards. In the bob Lazar movie, at the same place, some footage from March 22, 1989, at 08:57 pm is also shown.

Using the website [www.timeanddate.com](http://www.timeanddate.com), moonrise, moonset and twilight time data can be calculated for any date and any location.

Table 2-2 Moon phases and twilight times for Area 51, March-April 1989, [29]

Date	Moon phase	Moonrise	Moonset	Civil Twilight	Nautical Twilight	Astronomical Twilight	Time Zone
22-03-1989	Full Moon	18:33	05:40 +1	17:57 - 18:23	18:23 - 18:53	18:53 - 19:24	PST
29-03-1989	Waning gibbous ≈57% illum.	00:34	09:41	18:03 - 18:29	18:29 - 19:00	19:00 - 19:31	PST
05-04-1989	New Moon	05:53	19:04	19:09 - 19:36	19:36 - 20:07	20:07 - 20:39	PDT

Notes: PST = Pacific Standard Time, PDT = Pacific Daylight-Saving Time  
In 1989 the transition to daylight saving time took place on April 2, at 02:00 am.  
+1 indicates time next day

This implies that the sky was pitch dark at least on the first night in relation to twilight, but moonlight on this night would cast some light on the landscape in clear weather (see below) and lighten the sky.

On the second night at 8:30 pm (20:30) it was one hour past the end of astronomical twilight occurring at 19:31, and no moonlight until about a half hour past midnight, i.e. a pitch dark night.

On the third night it was new moon and pitch dark from the end of astronomical twilight.

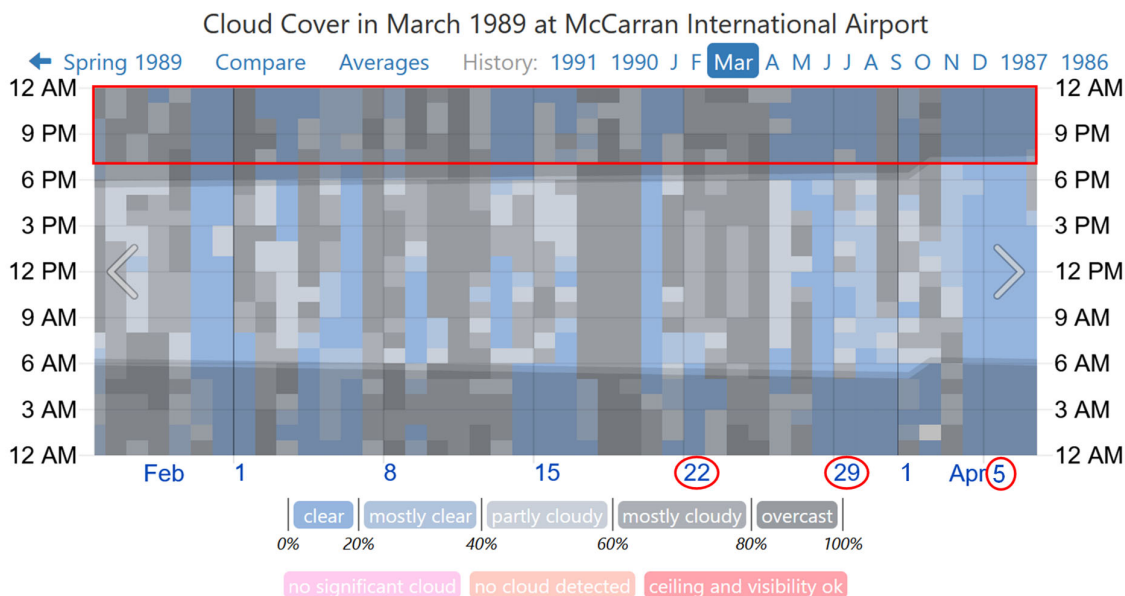
The weather conditions on the three nights are somewhat more difficult to assess. Area 51 is part of the Mojave Desert, [30], near the eastern boundary. Annual precipitation is very small, but despite this, it seems that overcast skies are quite common.

Searches for weather records for sites near Groom Lake or Papoose Lake has not been successful. Weather archive data for Groom Lake (Homey Airport) or other nearby airfields only go back to 2011. Tikaboo Peak has its own weather station, but weather data only goes back to 2011, [31].

The nearest site with weather records back to 1989 and before is Las Vegas McCarran International Airport, about 140 km southeast of Groom Lake. This distance reduces the correlation between weather at Las Vegas and at Groom Lake, although it seems that dominating weather systems are mainly coming in from the Pacific, so that a cloud cover will hit Groom Lake first and later Las Vegas, [30]. Therefore, it seems likely that the weather

conditions at Groom Lake and Papoose Lake are similar to those at Las Vegas McCarran International Airport for the relevant dates.

The graphics of Figure 2-5 indicates that on March 22 (with full moon) the skies were mostly cloudy. On March 29 and April 5, the skies were clear, [32], [33], [34].



The hourly reported cloud coverage, categorized by the percentage of the sky covered by clouds.

The red framed area is the hours from around 19:00 (7:00 pm) till midnight

Figure 2-5 Cloud cover in Las Vegas on the nights of disc test flights, [32], [33], [34].

**Then, what did Bob Lazar and his party see on the skies over Papoose Lake?**

During the entire story about the flying discs there is no reporting that they emitted light during flight. Only that they (or more precisely the Sports Model flying disc) emits a bluish corona-like discharge, [35], from the bottom of the craft while it takes off, [4] at 00:43:00, and that it disappears at 5 – 10 feet altitude.

This would prevent any sightings of the flying disc during a night setting at Freedom Ridge or anywhere else for that matter, unless Bob Lazar forgot to tell us, that the flying discs may become luminous if the pilots decide so. In "The Lazar Synopsis" by Gene Huff, [100], he tells that: "Bob also explained that the bright glow of the disc was due to the way it was energized". This is in contradiction with the statement about the bluish discharge at take-off mentioned above. The two short sequences of video from March 22 and 29 revealed in the Bob Lazar movie, [4] at 01:04:30, shows a luminous dot bouncing around, most probably due to the zoom lens being at max. telephoto setting, making it difficult to shoot a steady video with a hand-held camera. This footage really proves nothing.

Tom Mahood in his 2018 account, [18], has a completely different explanation: The Bob Lazar party was witnessing tests of a **particle beam weapon!!**

Even if this claim is not accompanied by any justification by Tom Mahood, it does make sense. It is well-known that the Department of Defense during the Strategic Defense Initiative (SDI) (nicknamed "Star Wars Program") announced on March 23, 1983, by President Ronald Reagan, [36], performed research and development of particle beam weapons, [37]. The SDI ended in 1993, so it was active during 1988-89, when Bob Lazar worked at S-4.

Tom Mahood provides more evidence to his claim about particle beam weapons development at S-4 in his article “Particle Beams and Saucer Dreams”, [38].

A particle beam weapon consists of a charged particle accelerator, which typically accelerates protons to very high energies, and a means for steering the direction of the beam. When high energy protons propagate in a medium, here: the atmosphere, they lose energy due to interaction with the atoms or molecules of the medium. Contrary to intuition, the energy loss of high energy particles per distance unit is not constant. The interaction of the high energy particles with the medium is weak in the beginning, and only close to the end of the range, a significant portion of the particle energy is dumped into the medium. This is due to the Bethe formula, which governs the so-called stopping power of a medium through which high energy particles propagate. This is analyzed in detail in Appendix F.

When a significant portion of the particle energy is dumped at the end of the maximum range, and if the particle energy is very high, then the air will become ionized like in a neon sign and glow in characteristic colors. The divergence of the particle beam and the short distance over which energy will be dumped, creates a glowing volume or orb with a disc-like shape.

Using the beam controls to steer the beam direction and adjusting the particle energy, will create the illusion at a distance of a flying disc performing out-of-this-world maneuvers. Anyone not familiar with particle beam weapons technology will easily be convinced that he or she is witnessing a flying disc test flight.

Divergence of the beam due to electrostatic repulsion between the positively charged protons is a challenge to an effective particle beam weapon. Therefore, it is likely that the test setup included a means of injecting electrons into the proton beam, the protons then capturing the electrons and becoming neutral hydrogen atoms, thus minimizing the beam divergence.

Tom Mahood in ref. [38] cites a local inhabitant about the sighting of “flying discs” above the Groom Lake area: *“It became distorted when it moved – part of it lagged behind the main object, then the trailing edge would catch up”*. This would be typical of a plasma cloud created by a particle beam. When the beam moves, the trailing part of the plasma cloud, no longer fed by the particle beam, fades, but not instantaneously. Therefore, there will be a trailing edge or “tail” effect of the moving orb.

Could this phenomenon be created by a flying disc based on alien super-high technology? Probably, but apart from the corona discharge from the bottom at take-off, there is no mention in the Bob Lazar story, that the disc will be embedded in a plasma cloud in flight or otherwise emit light.

The particle beam weapon conjecture by Tom Mahood makes sense both for the Bob Lazar night parties at Freedom Ridge (or another peak in the neighborhood of Area 51) and Bob Lazar’s work at S-4. Tom Mahood renders it probable that Bob Lazar was employed as an accelerator technician at LANL, [17], as a staff member of the Kirk-Mayer contractor working at LANL, and therefore included in the LANL phonebook. His accelerator experience would come in handy when he via Edward Teller in 1988 was enrolled in the classified activities at S-4, i.e. particle beam weapons development. At least according to Tom Mahood, [18].



### 3 The Sports Model Flying Disc

#### 3.1 Design

The design of the “Sports Model” flying disc, a name coined by Bob Lazar, is shown in Figure 3-1. The photo-realistic appearance of the disc in flight is due to a friend of Bob Lazar, Jon Farhat, a motion picture visual effects supervisor, which apparently has the talent of creating such models, and who owns the website <https://boblazar.com/>, [11].

The appearance and design of the disc is a “classical” flying saucer, as well-known from many illustrations in the UFO lore.



Figure 3-1 In-flight appearance of the Sports Model flying disc, from [11]

Figure 3-2 shows a cut-away rendering of the disc, which has two decks, and not three. It would seem natural that the top of the disc would be the flight deck with windows, but the seats for the “children” (the nickname given to the aliens as they are only about 1 meter tall), are located on the deck going through the middle of the craft. Here, the antigravity reactor is located in the center of the deck. The lower deck is reserved for the gravity amplifiers.



Figure 3-2 Cut-away rendering of the Sports Model flying disc, from [11]



Figure 3-3 shows an annotated section of the craft. The antigravity reactor is the hemispherical structure in the center with a tube extending from the reactor through the roof of the craft. The tube is denoted a (gravity) waveguide. The prismatic structures on the center deck are the three “gravity amplifiers”. On the lower deck below the gravity amplifiers are the (gravity) “amplifier heads” or “emitters”. These can swivel or pivot in two degrees of freedom, to direct the gravitational wave in a desired direction.

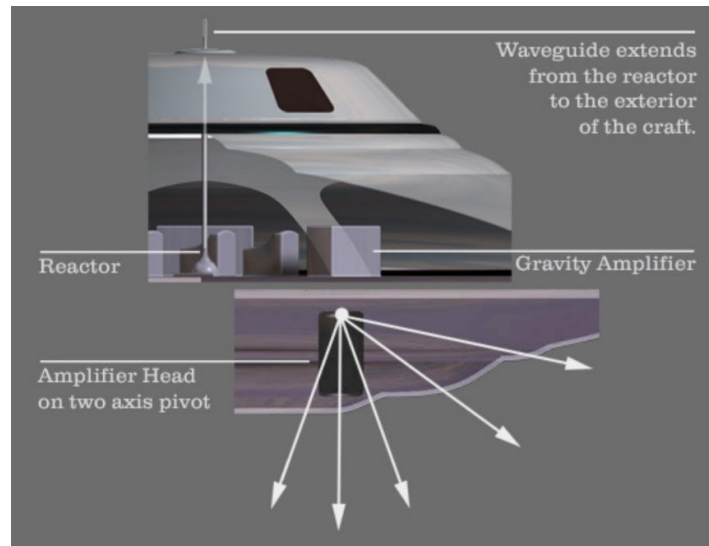


Figure 3-3 Key elements of the Sports Model flying disc, from [11]

According to Bob Lazar, there is no wiring, neither electrical power nor control, in the craft, and there are neither dashboard nor steering gear, just three seats for the crew.

## 4 The Antigravity Reactor

### 4.1 Overall Design

The overall design of the antigravity reactor is discussed and shown in several references. Figure 4-1 shows a model of the reactor from the boblazar.com website, [11]. A physical model, apparently built by Bob Lazar himself is shown in ref. [7], pages 8-1 to 8-6.

The actual dimensions of the reactor are a bit uncertain. In one reference, [59], the “pizzabox” base is stated by Bob Lazar to be 18 inches (46 cm) square, but on the so-called “Engineering Detail 'Sport Model' sketch” (Bob Lazar’s annotated sketch of the Sport Model flying disc as a poster, hand signed by Bob Lazar), [106], the pizzabox dimensions are given as 15 inches (38 cm) square. In ref. [7] page 8-8, the hemisphere is stated to be the size of a basketball (24.2 cm diameter) [51] or a medicine ball (35 cm diameter) [52]. Therefore, we assume that the diameter of the hemisphere is about 30 - 32 cm and that the “pizzabox” base is about twice the size, i.e. about 60 - 64 cm square. The thickness of the “pizzabox” is about 1/12 of the square or about 4.5 - 5 cm. However, if we go for the proportions of the “Engineering Detail 'Sport Model' sketch” and still assumes 30 - 32 cm diameter for the hemisphere, the pizzabox size is more likely to be in the 38 - 46 cm (15 - 18 inches) range.

According to Bob Lazar, the base contains a cyclotron accelerator, which accelerates protons to high energy. At the exit of the cyclotron, the protons are guided by a tube to the center tower inside the hemisphere, cf. Figure 4-1. This is discussed in more detail in section 4.4.

The center conical tower contains a wedge of element 115 Moscovium (standard abbreviation in the periodic table of elements: Mc), which according to Bob Lazar is stable (i.e., non-radioactive). Moscovium is the key to the antigravity produced by the reactor. Moscovium is discussed in more detail in section 4.3 below.

If the hemisphere is about 16 cm radius, the tower must be something like 13 - 14 cm high and having a base diameter of about 8 - 9 cm. The tower has a top cap, which holds the Moscovium wedge in place. There is no information in the available sources whether it is a screw-on or click-on or other method of keeping the top cap and thus the Moscovium wedge in place.

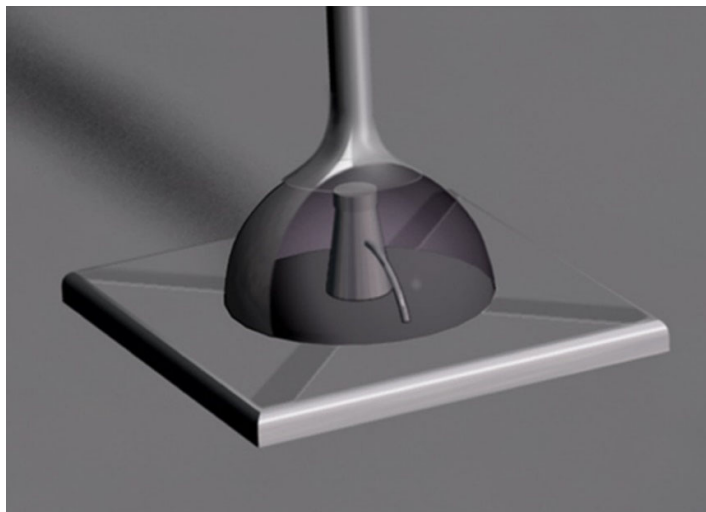


Figure 4-1 Cut-away model of the antigravity reactor, from [11]

Figure 4-2 shows a vertical section of the antigravity reactor with dimensions estimated from the sources listed above. As there is no drawing with dimensions in the public domain, the estimated dimensions have a fairly large uncertainty as suggested above.

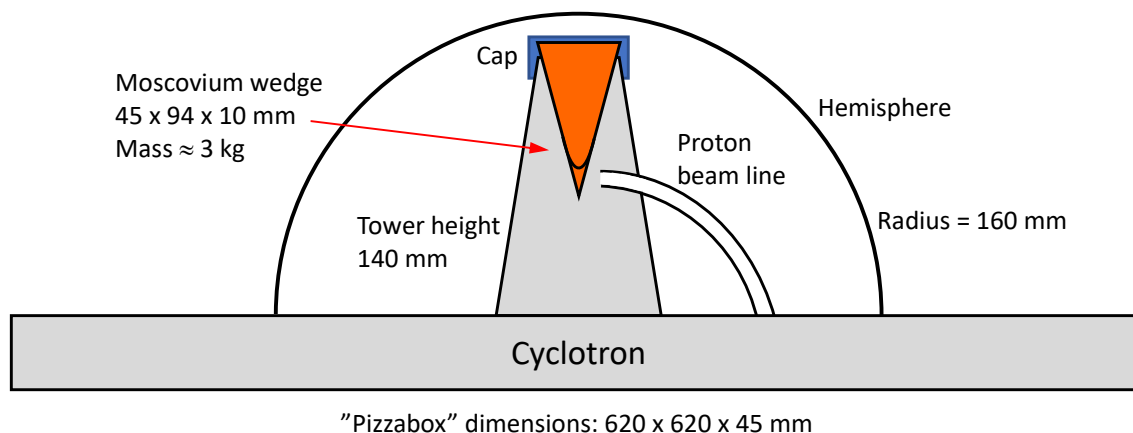


Figure 4-2 Vertical section of the antigravity reactor with estimated dimensions

It should be noted that on the engineering sketch by Bob Lazar of the Sports Model flying disc, available as a poster, [40], the tower height is indicated as 5 inches (127 mm), so the radius of the hemisphere must be somewhat larger than 130 mm. The proton beam line on Figure 4-2 is denoted “drift tube” on this drawing. A “drift tube” is actually an accelerator term, [90], but misleading in this context. The photo of the poster available at the United Nuclear website, [40], is precisely blurred to a point where most of the text and numbers are unreadable, so very little information can be retrieved from this source. A query to United Nuclear by the author on December 28, 2021 for a copy of the engineering sketch poster was returned on December 30, 2021 by staff member Zack Slizewski with the message that it was out of print. See also comment on Zack Slizewski in the Bob Lazar movie highlights, Appendix A, [4] at 01:18:57.

According to Bob Lazar, the Moscovium wedge is manufactured using a very special procedure, which is discussed in section 4.3.

Bob Lazar states that the reactor is turned on when you install the hemisphere in the designated position on the reactor, [4] at 00:12:30, i.e. on top of the “pizzabox”. However, it does not seem likely that this is the way that the reactor is turned on and off by the aliens when doing routine flights, but there is no information from Bob Lazar on this except that it can be done “in a lot of different ways”, [4] at 00:12:30. Neither does Bob Lazar give any information on the material of the hemisphere nor any clue to how the hemisphere interacts with the Moscovium in the reactor core.

According to Bob Lazar, the antigravity field can be felt as it pushes your hands away when you try to approach the hemisphere, after activating the reactor. In the Bob Lazar movie, [4] at 00:09:20, he states that he cannot touch the hemisphere when the reactor is running due to the strong antigravity field around it. So, to turn it off he must use one of the other ways, as mentioned above.

If we take verbatim the information given by Bob Lazar about the density of Moscovium, it is remarkable that the wedge will have a mass of around 3 kg. If the density is taken as  $31.5 \text{ g/cm}^3$ , the mass of the wedge is around 665 g. See discussion in section 4.3 below.

## 4.2 Gravity as a Wave

Moscovium is claimed by Bob Lazar to possess extraordinary properties w.r.t. gravity, being able to produce a “gravity wave” denoted “Gravity A”, which is a property of the nucleus of Moscovium and is different from ordinary gravity, “Gravity B” denoted by Bob Lazar the “big gravity wave”. This explanation was first given by Bob Lazar in the video “The Lazar Tape and Excerpts from the Government Bible”, [138] at 00:10:05.

These two types of gravity are also claimed in the works of Kenneth F. Wright, [7], [8], He does not use the terminology “Gravity A” and “Gravity B”, but the concept of gravitation in his “Nuclear Gravitation Field Theory” are the same as claimed by Bob Lazar. While Kenneth F. Wright gives a detailed (but flawed) mathematical/physical derivation of his theory, Bob Lazar just issues unjustified allegations. The relations between Kenneth F. Wright and Bob Lazar are discussed in detail in Appendix G, second part.

Actually, Bob Lazar in the Joe Rogan interview, [4] at 01:05:50, claims that **gravity is a wave** and not particles (gravitons). Also in the George Knapp interview at KLAS-TV, [6] at 00:08:05: “...they use **gravity as a wave** using waveguides, almost like microwaves”.

This is gibberish. Gravity is a force and in the classical Newtonian sense it is a property of everything that has a mass. Gravity has infinite reach, it pervades everything, and decays as  $1/r^2$  with distance. In the General Theory of Relativity by Einstein, gravity is the curvature of spacetime. If gravity could be “quantized”, i.e. described in a quantum mechanical framework like the other three forces of nature and being mediated by a particle, here the “graviton”, we would have a unified “Theory of Everything” and Nobel and other prizes would precipitate over the scientists accomplishing this.

Gravitational waves are created when masses are accelerated, completely analogous with electromagnetic waves, which are created when charges are accelerated. A stationary mass or a stationary electric charge just creates a static field and no waves. Examples of accelerated masses include binary star systems (like ordinary stars, neutron stars or black holes) orbiting one another. The Earth and the other solar system planets also generate gravitational waves by orbiting the Sun, but these waves are too weak to be detected by current technology.

It should be borne in mind that spacetime is an extremely stiff medium, and only very large masses in highly accelerated motion like inspiraling binary star systems shortly before they merge produce gravitational waves detectable by current technology.

Searches for “Gravity A” and “Gravity B” on the Internet and in scientific databases come out void. Gravitational waves, as discussed above, were proposed by Henri Poincaré in 1905 and subsequently predicted in 1915 by Albert Einstein as a consequence of his general theory of relativity, [45], so the concept is not new, and Bob Lazar has contributed nothing to this field of science.

## 4.3 Element 115, Moscovium

### 4.3.1 Island of Stability and Super-Heavy Elements

In 1955, the famous nuclear physicist J. A. Wheeler proposed the existence of super-heavy nuclei (a term that he coined), and elements, [74]. He derived his proposal from extrapolation of the existing model by Niels Bohr and himself, [75], of the spontaneous fission half-lives of heavy nuclei.

The idea of closed shells in nuclei was discussed in a paper by Maria G. Mayer in 1948, [78]. In the nucleus, protons and neutrons are organized in shells according to their energy states (by the Pauli exclusion principle, [79]). For certain numbers of protons or neutrons, their respective shell is closed or filled, and the next proton(s) or neutron(s) must occupy a higher shell number. Elements with closed nuclear shells are predicted to be more stable than those

with non-closed shells ... at least when we get past element 82 Lead (Pb) and element 83 Bismuth (Bi), the highest two stable elements in the periodic table of the elements.

The numbers of protons or neutrons corresponding to these closed shells are denoted “magic numbers”. The magic numbers 2, 8, 20, 50, 82 and 126 for protons and neutrons were established in ref. [78]. However, it has later been shown that the magic number 28 also exists. The higher magic numbers have also been established so that the two series of magic numbers now are:

Proton series:  $Z = 2, 8, 20, 28, 50, 82, 114, 126$ .

Neutron series:  $N = 28, 50, 82, 126, 184, 196, 228, 308$ . Ref. [124].

Even higher magic numbers are discussed in ref. [130].

Lead is a “double magic” element with  $(Z, N) = (82, 126)$  and atomic weight  $A = Z + N = 208$ .

In parallel with the research in nuclear energy states and shells, whether open or closed, research efforts were directed towards predicting the lifetimes of nuclei of the super-heavy elements. This research, pointed towards an “island of stability”, [132], i.e. a range of  $Z$  and  $N$  numbers, where predicted decay half-lives were very long, even up to billions of years like the naturally occurring Uranium isotope  $^{238}\text{U}$ , 4.46 billion years. Note that the prefix superscript to  $\text{U}$  is the atomic weight  $A$  of the isotope.

#### 4.3.2 Nucleosynthesis of Moscovium

Briefly after Big Bang, when the universe had cooled enough for subatomic particles to form and at the age of 380,000 years, atoms forming, the universe consisted of Hydrogen, Helium and a pinch of Lithium, [103]. Only after the first stars appeared, nucleosynthesis of heavier elements began. The nuclear fusion process in stars slowly builds up heavier and heavier elements via fusion of helium and hydrogen nuclei, releasing a copious amounts of energy, which power the star, [104]. The helium fusion process is the most efficient, and therefore even numbered elements tend to be more abundant than odd numbered elements. (This is a very simplified rendition of the processes). When the fusion process reaches element 26 Iron, it stops. From element 27 and up, fusion or nucleosynthesis requires an inflow of energy instead of releasing energy.

Nucleosynthesis of the heavier elements (but not the super-heavy elements) takes place in core-collapse supernova explosions of stars heavier than about eight solar masses. Elements up to number 37 Rubidium are synthesized this way, [105].

The heavier and super-heavy elements are synthesized in neutron star mergers via the so-called *rapid neutron capture process* or just *r-process*.

Neutron stars are remnants of supernova explosions like those mentioned above following a complete collapse of the stellar core until it reaches the density of that of atomic nuclei, and the internal pressure of the neutron star balances gravity. In the process, protons and electrons from the original star combine to form neutrons, [82].

Neutron stars are like super-sized atomic nuclei consisting mainly of neutrons. They typically have diameters of 10 to 20 km and masses of 1.1 to 2.16 solar masses, [82]. A typical neutron star is 10 km in diameter and has a mass of 1.4 solar masses. Neutron stars more massive than 2.5 to 3 solar masses would collapse into a black hole. A binary neutron star, two neutron stars orbiting one another, will slowly inspiral as they emit gravitational waves and loose energy. When they merge, a gigantic explosion takes place, which is known as a kilonova, [82], [83].

At the instant of the merger, temperature raises to more than 1 GigaKelvin ( $10^9$  K) and the density of neutrons to around  $10^{27}$   $\text{cm}^{-3}$ , (neutrons per  $\text{cm}^3$ ) [112]. (Other references state neutron densities from  $10^{24}$   $\text{cm}^{-3}$  and upwards). In this extremely hot and dense environment, synthesis of heavy and super-heavy elements speeds along via the *r-process* path. Note that

the density of  $10^{27} \text{ cm}^{-3}$ , corresponds to a density of  $1.676 \text{ kg/cm}^3$  or 87 times the density of gold. This is very heavy stuff !!! However, this is nothing compared to the neutron star itself, which has an overall density of around  $5 \cdot 10^{11} \text{ kg/cm}^3 = 500 \text{ million tons per cm}^3$  !!!, [82].

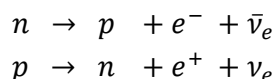
All the parameters characterizing a neutron star merger are mind-blowing, but before these are presented, the r-process will be discussed, as this is the key to the synthesis of super-heavy elements.

A theory of the astrophysical nucleosynthesis of the super-heavy elements by the r-process was first established by Burbidge, Burbidge, Fowler and Hoyle in their 1957 seminal paper (denoted the B<sup>2</sup>FH paper), [76]. The basic development of the theory of the r-process happened in the 1950'ies and 1960'ies and is outlined in ref. [77]. Since then, theories of the r-process nucleosynthesis have been developed much further.

To comprehend the r-process it is useful to study an illustration of the nuclear landscape of isotopes like that in Figure 4-3. The abscissa is the number of neutrons  $N$  and the ordinate is the number of protons  $Z$  or atomic number of the element. The black squares are known, stable isotopes of the elements up to element  $^{238}\text{U}$  (Uranium-238), which is stable in the sense that its half-life is  $\approx 4.5$  billion years. Beyond that element, the Japanese KTUY nuclear mass model, [114], predicts stable elements up to at least  $Z = 145$ . This trace is also known as the "valley of stability", [117]. In fact, ref. [130] deals with the possible stability of elements in the extremely superheavy range up to  $Z = 175$ . The KTUY model itself is defined in ref. [129].

In the lowest numbered elements, it is evident from the illustration that there are an equal number of protons and neutrons. However, for elements above  $Z \approx 16$ , the curve of black squares deviates to the right or bends down from a  $Z = N$  curve, implying that heavier elements need more neutrons in the nucleus to stabilize it against radioactive decay.

The open squares with a color other than black indicates known radioactive isotopes, and the color tells the decay mode. The larger blue area is range of nuclei, which exhibit beta-decay, [115], i.e. the emission of an electron or a positron (antielectron) through the nuclear reactions:



...where  $n$  is a neutron,  $p$  is a proton,  $e^-$  and  $e^+$  are the electron and positron respectively, and  $\nu_e$  and  $\bar{\nu}_e$  are the electron neutrino and electron antineutrino respectively. This means that the beta-minus decay increments  $Z$  by 1 and decrements  $N$  by 1, while the beta-plus decay decrements  $Z$  by 1 and increments  $N$  by 1. The atomic weight number  $A = Z + N$  is maintained during beta-decay. The neutrinos ensure that the physical conservation laws are fulfilled, cf. discussion in section 4.5.

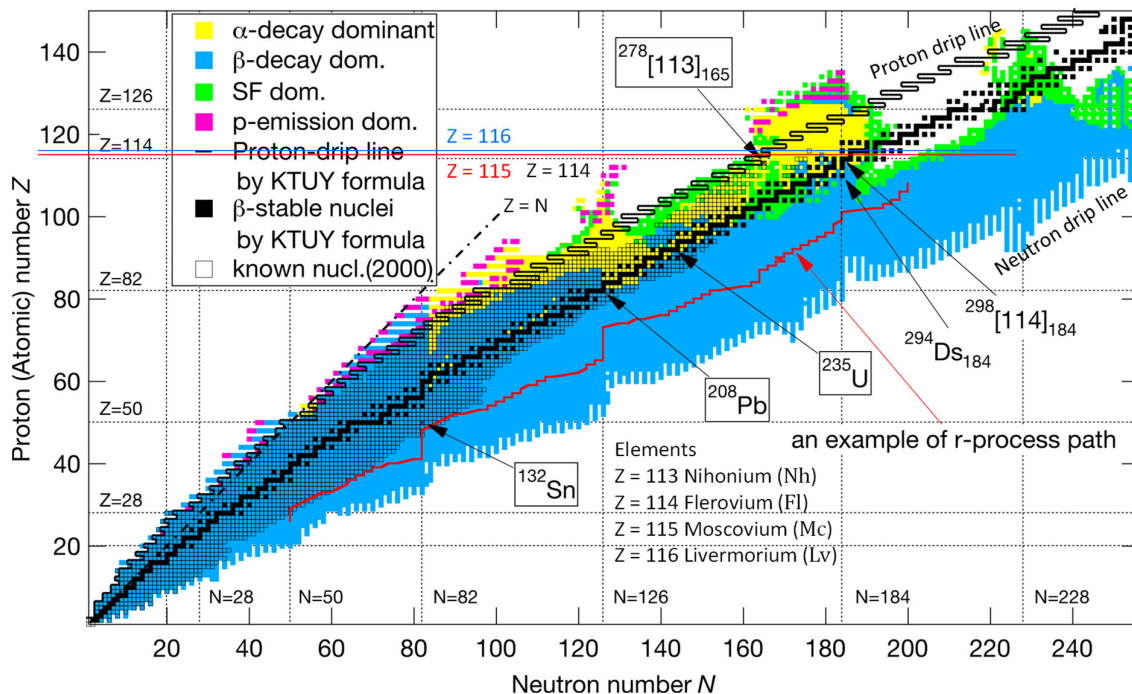


Figure 4-3 The nuclear chart from the KTUY model, annotated, from [113]

The realm of super-heavy elements of interest here, i.e. elements 115 and 116 lie in the yellow area where alpha-decay is dominant. Alpha-decay implies that a nucleus of Helium consisting of two protons and two neutrons is ejected, which incurs a loss of four in atomic weight, and Z decrements by two units. This is in line with the observed decay modes of synthesized Moscovium isotopes as discussed in section 4.3.4.

Green areas indicate that spontaneous fission is dominant, i.e. the nucleus breaks apart and leaves two lighter nuclei.

Two borders ultimately limit the composition of nuclei: The proton and neutron drip lines. The proton drip line is the black zig-zag like line above left of the valley of stability. Nuclei which happen to be created beyond this line are too meagre in neutrons and will “drip off” protons and move towards stability.

The neutron drip line marks the lower edge of the nuclear landscape, i.e. the jagged border between the blue and white area below the valley of stability. The neutron drip line is known with less precision than the proton drip line. Nuclei which happen to be created beyond this line will drip off neutrons and move towards stability.

Finally, there is the red line which is the center of interest here. The red line is a typical path through the nuclear landscape taken by the r-process, e.g. during a neutron star merger. However, the r-process path shown in Figure 4-3 is a bit too simplified, and therefore we turn to Figure 4-4, which shows a characteristic segment of the r-process path (blue line).

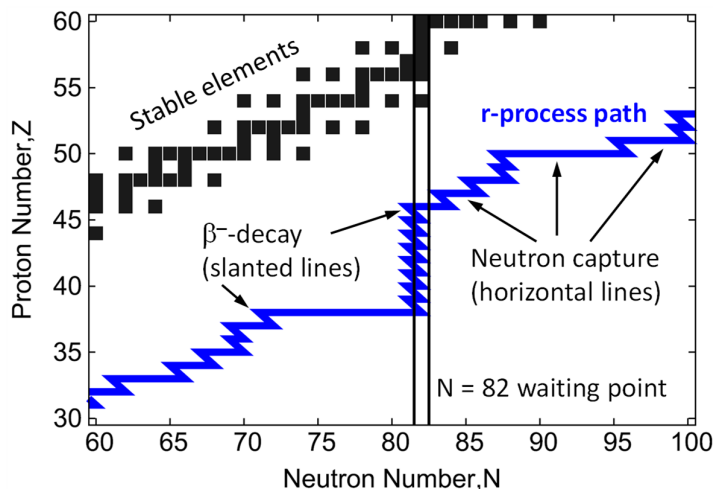


Figure 4-4 Illustration of the (N,Z) path of r-process nucleosynthesis (blue line), annotated, from [116]

The horizontal segments of the path signifies neutron capture while maintaining the number of protons in the nucleus. At some points, the path deviates to the left and up, incrementing Z by one and decrementing N by one, indicating a beta-decay, in which a neutron converts to a proton, an electron and an electron antineutrino as discussed above. When the r-process approaches one of the closed nuclear neutron shells, i.e. one of the magic numbers discussed in section 4.3.1, the neutron capture speeds up, but at the magic number of neutrons it reaches a “waiting point” because the cross-section or probability of capturing more neutrons is low when the neutron shell is closed. This allows the beta-decay to lift the Z-number several positions alternating with single neutron captures, until rapid neutron capture proceeds. The nucleosynthesis is actually only possible because on the average neutron capture is much faster than beta-decay.

In addition to the required temperature and neutron density, appropriate seed nuclei must be available to enable the r-process to run. Seed nuclei are light elements, predominantly iron from the fusion process running in the progenitor star, which ended its life as a core-collapse supernova and created the neutron star. A neutron star is not just composed of neutrons. The envelope contains ample amounts of iron nuclei from the progenitor star, and the outer and inner crust contains other nuclei enriched by neutrons, [135]. These layers provide the seed nuclei for the r-process.

Characteristic of the r-process is that it proceeds deep inside the blue area of the nuclear landscape. The question of interest here is when will the r-process come to a halt and how far in the nucleosynthesis does it reach? The r-process stalls at the so-called “freeze-out” of the neutron environment following the neutron star merger, i.e. when the neutron density and temperature gets too low to sustain the r-process due to the rapid expansion of the material ejected following the neutron star merger.

Figure 4-5 shows an excerpt of Figure 4-3 centered on the elements of interest here. When reaching the magic number of neutrons  $N = 184$ , a new waiting point is reached, but there are indications in the models of the r-process that the effects of closed nuclear shells become less pronounced at high N numbers. Therefore, the vertical segment of the r-process at  $N = 184$  is smaller than at lower N.

Figure 4-5 based on the KTUY model indicates that the Moscovium isotope  $^{301}\text{Mc}$  should be stable. Other models are less optimistic about the existence of a stable isotope of Moscovium or other superheavy elements in this range, [122], [123]. This is mainly due to the prediction



that spontaneous fission and neutron-induced fission will be the main decay channels of nuclei above  $Z = 100$ . Neutron induced fission occurs when absorbing a neutron deforms the nucleus so that it is no longer stable and splits into two fragments travelling apart at high speed due to coulomb repulsion. This is the process taking place in nuclear reactors and nuclear bombs. However, fission plays another role in the r-process as it provides new light seed nuclei and thus provide new input material to the r-process.

Models of the r-process in neutron star mergers also disagree whether the region of  $A \approx 300$  will be reached at all, [112], [116], [127], [128]. The disagreements are mainly due to the large discrepancies between models of the spontaneous fission lifetime of the synthesized nuclei. If the r-process path passes through elements, which exhibit spontaneous fission at an extremely short timescale, then the “island of stability” and superheavy elements may never be reached. At the present stage of the research in the r-process we are therefore left in uncertainty about whether Moscovium will be created in neutron star mergers, whether Moscovium has a stable isotope and, if created by the r-process and stable, how much Moscovium should we expect to find in the universe, i.e. the abundance of this element in the r-process products?

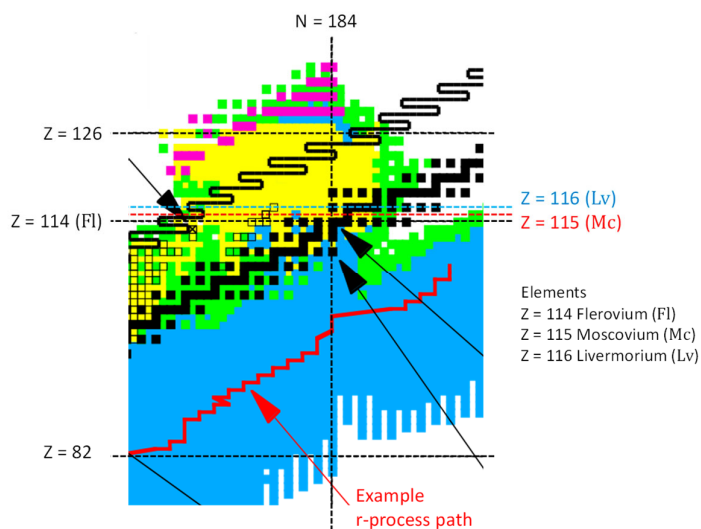


Figure 4-5 Excerpt of the nuclear chart from the KTUY model, annotated, from [113]

The occurrence of the neutron star merger on August 17, 2017, detected by the LIGO and VIRGO gravitational wave detectors and denoted GW170817, and 1.7 seconds later in the electromagnetic spectrum as a gamma ray burst denoted GRB17817A by detectors on board the FERMI and INTEGRAL space telescopes, [118], provided scientists for the first time with a front seat view of such an event both in gravitational waves and virtually in all wavelength bands of the electromagnetic spectrum.

This event, which happened in our cosmic neighborhood at around 130 million lightyears distance, provided evidence to support the theories of the r-process nucleosynthesis, the neutron star merger process itself, and confirmed the prediction by Einstein’s general theory of relativity that the velocity of gravitational waves and light (electromagnetic waves) are identical. Particularly, the identification of the element strontium in the optical spectrum of the kilonova (the name given to the type of cosmic event following the neutron star merger), [119], confirms that the r-process was taking place during the event, as strontium is one of the elements, which can only be synthesized via the r-process.

So far, the r-process is the key to the possible synthesis of Moscovium and other superheavy elements, but current models of the r-process do not agree on the upper limit of atomic weights of the process elements. Identifying Moscovium in our galaxy or elsewhere in the Universe is hampered by the fact that too few Moscovium atoms have been fabricated in set-ups here on Earth, which has prevented the measurement of its emission spectrum. The emission spectrum must be known for us to identify an element in a spectrographic survey of a cosmic event or location. The NIST Atomic Spectra Database, [91], comes out empty, when you enter Mc or Moscovium. **We simply do not know what to look for!!** Therefore, a natural occurrence of Moscovium as an outcome of a neutron star merger, in the solar system or in other star/planet systems is still an open question. More about this in section 4.3.5.

Now it is time to look at some characteristic numbers of the neutron star merger leading to GW170817. The numbers are mainly quoted from ref. [120], while other references give different numbers. Note that  $M_{\odot}$  is the solar mass symbol. Note also that one solar mass is close to 333000 Earth masses:  $1 M_{\odot} \approx 333000 M_{\oplus}$ , where  $M_{\oplus}$  is the Earth mass symbol.

- Estimated masses of the two neutron stars:  $1.48 M_{\odot}$  and  $1.27 M_{\odot}$
- Heavy elements created ( $A > 140$ ):  $0.01 M_{\odot} = 3330 M_{\oplus}$
- Amount of gold created:  $100 - 200 M_{\oplus}$
- Amount of uranium created:  $30 - 60 M_{\oplus}$
- Energy released into the gamma ray burst:  $10^{42} - 10^{43}$  Joule  
corresponding to the total solar energy output in  $\approx 80 - 800$  million years

Other references quote larger numbers of mass of the ejecta, i.e. the matter created by nucleosynthesis. Ref. [125], [126], [133], [134], quotes up to  $0.06 M_{\odot}$  of heavy elements created.

These numbers are truly mind-blowing. Owning just a truckload of the gold created would certainly make a nice pension fund 😊 – and a ton of Moscovium would make for some interesting experiments !!!

**But the really mind-blowing number is that the time from the coalescence of the two neutron stars until freeze-out of the r-process is less than two seconds !!!**

If you were close enough to witness the event with your eyes, at the time you jaw drops, the r-process nucleosynthesis would be all over. However, this would likely be your last experience, as you would be grilled to death by the gamma-ray burst that follows.

### 4.3.3 Antigravity Properties of Moscovium

The entire story about the antigravity reactor hinges on the super-heavy element number 115 Moscovium.

The idea of antigravity properties of an element, which has one more proton than a double magic element, is likely to stem from U.S. Patents 3,626,605 and 3,626,606 from 1971 discussed in Appendix J. Here element 83 Bismuth is supposed to possess antigravity properties. Bismuth follows lead (Pb), element 82 with 126 neutrons (a double magic element), adding one proton. Bismuth and Moscovium belongs to group 7 of the periodic table of the elements, starting with Nitrogen, also denoted the group of pnictogens. Elements of the same group are denoted homologues and have similar physical and chemical properties due to the outer nuclear and electron shells being populated in the same way while all the lower shells are closed. This is typical of the lighter elements of a group.

When we pass into the transactinide elements, i.e. elements with 104 protons (Rutherfordium, Rf) and upwards, relativistic effects modify the properties so that the homologous heritage of

properties becomes less pronounced. The relativistic effects are due to the fact that the innermost electrons “orbit” the nucleus at speeds approaching the speed of light. This affects the chemical properties and physical properties. Inside the nucleus itself transactinides also feel the growing number of nucleons. Even if the strong nuclear force keep the nucleus intact, an effect called “coulomb frustration”, caused by electrostatic repulsion of the protons, redistributes these tending towards a “bubble structure”, i.e. the center of the nucleus is void of protons, and they congregate instead near the surface, [121]. Therefore, we should be careful extrapolating the properties of elements based on homology.

Anyway, the antigravity property of Moscovium is what Bob Lazar claims. Similar claims based on Bismuth are made in U.S. Patents 3,626,605 and 3,626,606, cf. Appendix J. It should be emphasized that no peer-reviewed scientific papers have been identified, which claim such properties of Moscovium.

In the Bob Lazar movie there is much talk about a cloud chamber test, [4] from 01:22:45, and footage of a video displaying a cloud chamber. This cloud chamber test according to George Knapp, [4] from 01:23:25, who witnessed the test, was supposed to be a sample of element 115 Moscovium. However, this seems ridiculous as Bob Lazar has stated that Moscovium is stable and non-radioactive and therefore does not create any tracks in a cloud chamber.

George Knapp in the movie, [4] from 01:23:25, states: *“This beam of light was bent, and it was bent because they had a lump of 115 in this part of the experiment. Well, that’s pretty important. It would be huge to include it into the story”*.

Taken verbatim, this reveals two things:

1. A sample of Moscovium has been sneaked out of S-4.
2. George Knapp claims that Moscovium can bend light due to its gravity field.

Re 1. Bob Lazar, every time questioned if he has sneaked a sample of element 115 out of S-4, strongly declines having done this.

Re 2: What did George Knapp actually see ??? He also states, [4] from 01:23:25: *“I was there the night, the day they did the cloud chamber test. I couldn’t tell what it was. I didn’t know what a cloud chamber was”*. So is he a credible witness, when he actually had no knowledge about what he witnessed ???

For information on the operation of a cloud chamber, turn to ref. [141].

#### 4.3.4 Physical Properties of Moscovium

According to Bob Lazar, Moscovium is a naturally occurring material on the home planet of the aliens in the Zeta 2 Reticuli star system, [4] at 00:20:10. In ref. [7] page 5-1, this is stated to be the fourth planet.

Neither Moscovium nor other super-heavy elements have been detected here on Earth, even in trace amounts. This is discussed in more detail in section 4.3.5.

Moscovium is stated to be a copper-orange metal with an exceptionally high density. That Moscovium is a metal, or more precisely a so-called post transition metal, is in accordance with current nuclear theories, [60].

In ref. [7] there is statement allowing us to derive the density of element 115: The copper-orange colored fuel pellet aliens use is about the size of a US fifty-cent piece, and it weighs 223 grams, [7] page 4-5 (39 PDF), page 8-2 (122 PDF).

A fifty-cent piece has a diameter of 30.61 mm and thickness 2.15 mm, [55]. The volume is then  $1.5822 \text{ cm}^3$ . A same sized Moscovium piece weighing 223 g would then imply a density of  $141 \text{ g/cm}^3$  !!

Other sources, like [96], indicate that the density of Moscovium is  $31.5 \text{ g/cm}^3$ . No reference is given to the origin if this figure.

According to ref. [56] page 464, Moscovium is predicted to have a density of 13.5 g/cm<sup>3</sup>, similar to Mercury (element 80). This is 10 times less than purported by Bob Lazar. The known elements with the highest densities are element 76 Osmium at 22.587 g/cm<sup>3</sup> and element 77 Iridium at 22.562 g/cm<sup>3</sup>, which is far below the density of Moscovium claimed by Bob Lazar.

The melting point of Moscovium is estimated to ≈700°C, [57] page 1182 Table III, but Bob Lazar claims it to be 1740°C, [59], which is also indicated in ref. [96].

It is very impressive that chemical properties of super-heavy elements can be obtained even if the production rate is one atom per day or even lower, and if the lifetime of the nuclide is 1 sec. or longer, [92]. However, we are not there yet.

Both Moscovium and Livermorium, which according to Bob Lazar is created in the antigravity reactor by bombardment of Moscovium by protons, have been synthesized here on Earth. However, the heaviest Moscovium isotope produced is <sup>290</sup>Mc, [85], i.e. we are nine neutrons short of producing the isotope <sup>299</sup>Mc, which would have the magic number of neutrons 184, and therefore expected to be stable or at least have a very long half-life. The half-lives of the synthesized Moscovium and Livermorium isotopes are listed in Table 4-1, [85], [86], [97]. It is evident that the half-lives of the Moscovium isotopes increase with the atomic weight, i.e. the sum of protons and neutrons in the nucleus. This bodes well for longer lifetimes of the heavier isotopes. The same tendency, though not so pronounced is also the case with the Livermorium isotopes.

The decay modes of both Moscovium and Livermorium are for all known isotopes alpha-decay, i.e. a nucleus of the Helium atom consisting of two protons and two neutrons is expelled. In this way the nucleus loses 4 units of atomic weight and drops two numbers in periodic table of the elements. These are the known decay modes of the isotopes of the two elements. The antiproton decay mode of Livermorium purported by Bob Lazar is discussed in section 4.5.

Table 4-1 also displays the number of atoms observed in the experiments where they are produced, and on the basis which the half-lives are estimated. These numbers are certainly extremely small and in no way tangible amounts, but these are what can be produced with present methods.

Table 4-1 Lifetimes and decay modes of known Moscovium and Livermorium isotopes

Moscovium				Livermorium			
Isotope	Half-life	Decay Mode	Number of nuclei observed	Isotope	Half-life	Decay Mode	Number of nuclei observed
<sup>287</sup> Mc	37 ms	α	3	<sup>290</sup> Lv	8.3 ms	α	11
<sup>288</sup> Mc	164 ms	α	46	<sup>291</sup> Lv	19 ms	α	4
<sup>289</sup> Mc	330 ms	α	16	<sup>292</sup> Lv	13 ms	α	9
<sup>290</sup> Mc	650 ms	α	6	<sup>290</sup> Lv	57 ms	α	5
<sup>299</sup> Mc	???	???	N/A	<sup>294</sup> Lv	54 ms ?	α	???
				<sup>300</sup> Lv	???	???	N/A

### 4.3.5 Moscovium as a Naturally Occurring Element?

The fact that Moscovium or other super-heavy elements have not been detected here on Earth, even in trace amounts, is a challenge to the claim by Bob Lazar that Moscovium is a naturally occurring element on the home planet of the Zeta Reticulans. Therefore, a search was made for scientific investigations of the possible findings of superheavy elements in the Earth's crust, meteorites cosmic radiation and elsewhere.

In the late 1960's it was realized that super-heavy elements in the range  $Z = 108$  to  $114$  could be synthesized by the r-process (see above) and that these elements could lie in an "island of stability" in the periodic table of the elements, physicists began systematic searches for super-heavy elements in mineral deposits, ores and tailings from processing of ores, and in meteorites using ultra-sensitive analysis methods, allowing detection of concentrations down to  $10^{-15}$ , [102]. These efforts are documented in refs. [54], [101], [102] and [131]. The investigations included both searches for the elements themselves and characteristic decay/fission products. The analysis methods were sensitive enough to detect super-heavy elements if their half-lives were larger than  $2 \cdot 10^8$  years, or even down to  $10^5$  years if characteristic decay/fission products were identified, [102]. However, no super-heavy element was detected with certainty. The identification of excess content of the Xenon isotope  $^{136}\text{Xe}$  in some meteorites, suggest that it could be a fission product of element 111 or 115, [102], but this has not been confirmed.

For the super-heavy elements to be found here on Earth, one or more neutron star mergers must have seeded the primordial cloud of the solar system with stable super-heavy elements. These elements must then during planet formation end up in the Earth's crust for us to find them.

Could this process have come up more profitable on another planet? What if a neutron star merger took place at the optimum instant and place in the vicinity of a primordial cloud and seeded it with generous amounts of super-heavy elements? Further, the ejecta from a neutron star merger moving at something like one fifth of the speed of light would create a shock front in a nearby primordial cloud and may actually trigger star formation, and at the same time seed the cloud with heavy and super-heavy matter created in the merger by the r-process as discussed in section 4.3.2 above.

We don't know, and we may never know, but it cannot be excluded ... conditioned on the existence of stable isotopes of element 115 and the others.

Again, it is concluded that the research in super-heavy elements and the search for them in nature started decades before Bob Lazar began talking about element 115 and that the search for naturally occurring super-heavy elements in nature has so far been in vain.

To search for super-heavy elements in other star and planetary systems, we would need to determine the emission spectra of these systems. In this way we can identify elements occurring naturally, but we must know what to look for, and this is the challenge. So far, emission spectra have only been determined of elements up to number 99, Einsteinium (Es), as retrieved from the NIST Atomic Spectra Database, [91]. As mentioned above, attempting a query with Moscovium and its neighbors in the periodic table of elements yields a void response. The fact that only a few dozen atoms have been produced of the short-lived, heaviest elements, means that their spectra has not yet been determined. There is hope, though, that this can be accomplished in the near future. Very sensitive methods allowing the determination of emission spectra one atom at a time, has been developed, [98], and if these methods can be combined with the accelerator setup producing the super-heavy atoms, we may soon know their emission spectra.

#### 4.3.6 Manufacturing of the Wedge for the Antigravity Reactor

In ref. [7] page 9-1, Bob Lazar states that a sample of Moscovium was sent to Los Alamos National Laboratory to be turned and milled into the wedge shape for the antigravity reactor. Citing from [7] page 9-1: *"The Los Alamos personnel were told it was a new form of armor. They simply followed orders, milled it in accordance with the following steps, and sent it back to Groom Lake"*. "Following orders", yes, but this is certainly astonishing. Anyone holding in his hands a large sample of a metal with more than seven times the density of gold would be

stunned and ask questions. Even if the density was only  $31.5 \text{ g/cm}^3$ , the weight of the material would be astonishing. How could this go uncommented?

The manufacturing process for the Moscovium wedge goes in four steps:

1. Moscovium is made into coin-like discs about 45 mm in diameter and a couple of millimeter thickness (This is somewhat larger than the fifty-cent coin size mentioned by Bob Lazar, but the dimensions derived for the tower does not match with 30 – 31 mm discs. The wedge triangle would then get a too small base).
2. A stack of discs are fused together to make a cylinder of the desired height. Nothing is mentioned by Bob Lazar about this process.
3. Using a lathe, the cylinder is turned into a cone.
4. The cone is divided in three by two cuts so that the middle part becomes a wedge.

There is no justification given by Bob Lazar about this peculiar procedure. Nor is there any information on how they got the raw Moscovium to be machined into a wedge. Did the Zeta Reticulans donate a block of raw Moscovium to the staff at S-4?

In this part of the story it is strikingly puzzling why S-4 dared to send Moscovium material out of the restricted area to LANL for processing. The risk of leaks about this extraordinary material and the risk of retaining at LANL even a tiny shaving from the processing would be imminent and seems in strong contradiction to the concealment of everything going on at S-4.

Apart from the disc fusion process, a turning lathe and a milling machine would be all that is required for the manufacturing of the wedge. The lack of details about the fusion process of the stack of Moscovium discs leaves an open question about the required tools and methods for this process. Anyway, it is hard to find any justification for passing the manufacture of the Moscovium wedge to LANL. The amount of shavings produced by the turning and milling process would with near certainty leave a tiny fragment of element 115 behind at LANL. It would be much less risky to keep this process at S-4.

#### 4.4 The Cyclotron

The cyclotron was invented in 1929–1930 by Ernest O. Lawrence at the University of California, Berkeley and patented in 1932, [61].

This is the type of accelerator stated by Bob Lazar to be inside the pizzabox base of the antigravity reactor.

The principle of the cyclotron is shown in the schematic in Figure 4-6. It consists of a flat cylinder vacuum chamber in which two hollow, flat semi-cylindrical electrodes (D-shaped and called “Dees”) are suspended on insulators. A high frequency alternating current (AC) source is connected to the Dees. A uniform magnetic field perpendicular to the cylinder and covering the entire cylinder area is created typically by a powerful electromagnet.

The charged particles, here protons, are injected at low speed into the center of the cylinder. The alternating electric field between the Dees created by the sine-wave, high frequency AC source begin accelerating the protons in the gap between the Dees and the transverse magnetic field bends the protons into a circular trajectory due to the Lorentz force, [62]. The frequency of the AC source is tuned to the cyclotron resonance frequency of the protons so that once the acceleration begins in the center, the protons always pass the gap between the Dees when the electric field is such that the protons feel a maximum accelerating force at the peaks of the sine-wave. As the protons gain kinetic energy, they spiral out from the center as the bending radius increases with energy and speed of the protons. As long as the velocity of the protons is much lower than the speed of light (non-relativistic), the cyclotron frequency remains the same, and thus the cyclotron can accelerate protons continuously.

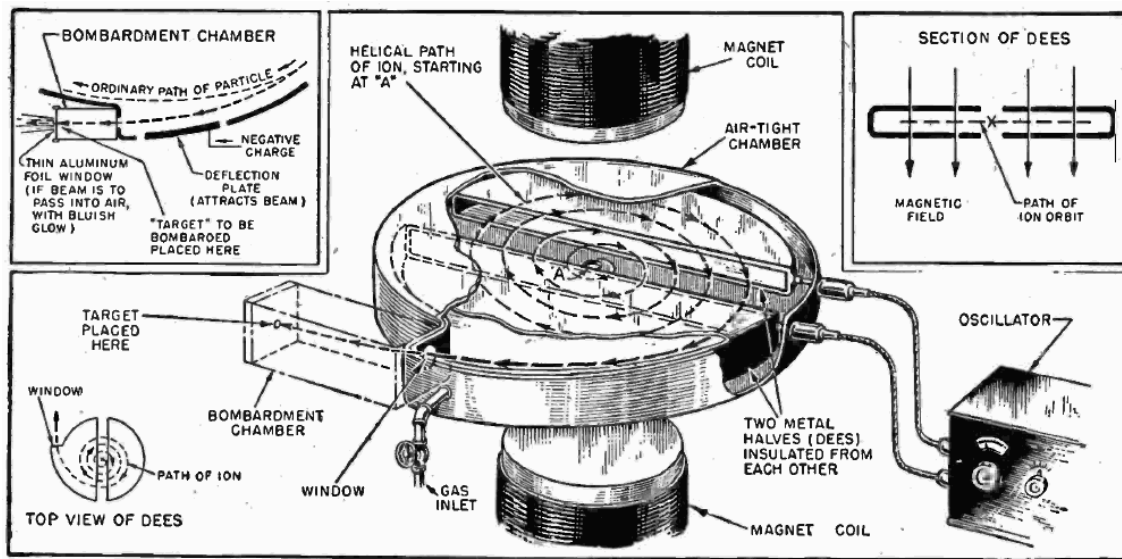


Figure 4-6 Schematic of the cyclotron accelerator, [61]

When the protons reach the inner circumference of the Dees, they are extracted along the tangent by a negatively charged electrode. The protons can then be let out of the vacuum chamber through a thin aluminium foil window or continue in an evacuated beamline (tube) and fed to experiment setups.

It is evident that the higher the magnetic field through the chamber the higher energy is reached by the protons before they reach the periphery of the Dees. Traditionally, the magnetic field was created by a strong electromagnet with a huge iron yoke to close the magnetic circuit. This is shown in Figure 4-7.

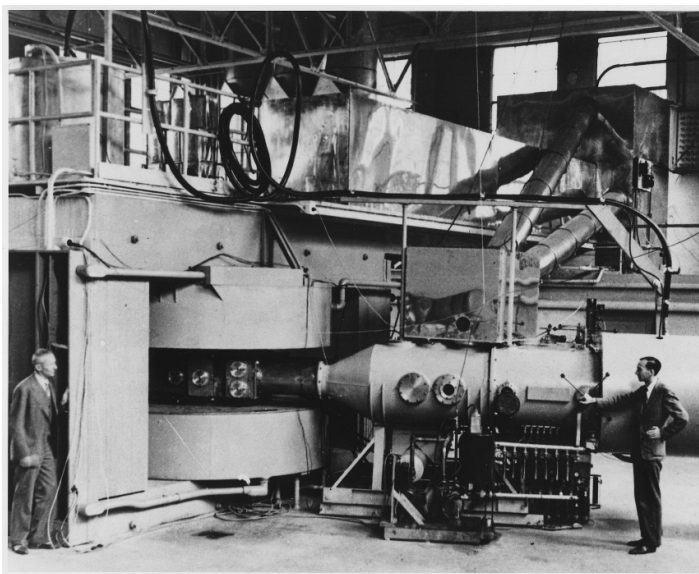


Figure 4-7 Lawrence's 60 inch, 16 MeV cyclotron from 1939, [61]

The cyclotron frequency is given by, [61]:

$$f = \frac{qB}{2\pi m}$$

...where q is the charge of the electron (and proton), B is the magnetic field and m is the mass of the proton.

The energy of the particles at the exit from the cyclotron is given by, [61]:

$$E = \frac{(qBR)^2}{2m}$$

...where R is the radius of the Dees. The relative velocity  $\beta$  of the protons w.r.t. the velocity of light c is (non-relativistic), [61]:

$$\beta = \frac{v}{c} = \frac{qBR}{mc}$$

Before we can calculate these parameters, we must look at the cyclotron design for the antigravity reactor. Can a cyclotron really be fit into the “pizzabox”? When looking at Figure 4-6, and pictures of other cyclotrons, there does not seem to be much hope.

Firstly, we must try to use permanent magnets instead of a huge and power hungry electro-magnet. Today’s strongest permanent magnet are made from a Neodymium-Iron-Boron alloy. The remanent magnetic field is 1.5 T (Tesla) for the best available magnets. They are typically made in flat cylindrical form, [63].

It is assumed that the pizzabox is slightly larger than 60 cm square, e.g. 62 cm ( $\approx 24\frac{1}{2}$  inch), so that the inside radius of the Dees is R = 30 cm. The height of the pizzabox is assumed to be about 1/10 of the base, i.e. about 6 – 7 cm.

Using two layers of permanent magnets  $\varnothing 50 \times 15$  mm, e.g. like [63], one above and one below the vacuum chamber, there will be room for the vacuum chamber and a fairly thick iron yoke around the chamber to close the magnetic circuit. See the sketch in Figure 4-8. We therefore assume that B = 1.5 T. However, the estimated 45 mm thickness of the pizzabox, cf. Figure 4-2, may not suffice for the cyclotron. Within the thickness we need to have room for:

2 layers of iron yoke .....	2 x 5 mm
2 layers of Neodymium-Iron permanent magnets.....	2 x 15 mm
2 walls of the vacuum chamber (non-magnetic) .....	2 x 2 mm
The Dees .....	10 mm
2 x spacing between the Dees and the vacuum chamber .....	2 x 5 mm
-----	
Total .....	64 mm

This coarse estimate may not even suffer. Maybe the permanent magnets have to be thicker, and the walls of the vacuum chamber probably have to be either made a bit convex, so that the chamber will not implode, or to need to be thicker. Further, a detailed analysis of the magnetic circuit through the yoke, may also result that a greater thickness is needed. Finally, the high AC voltage applied to the Dees may require a larger separation between the Dees



and the vacuum chamber walls. However, it is outside the scope of the present version of this report to dive into these details. The intention here was to lend some credibility to the feasibility of integrating a cyclotron in the “pizzabox” base of the antigravity reactor.

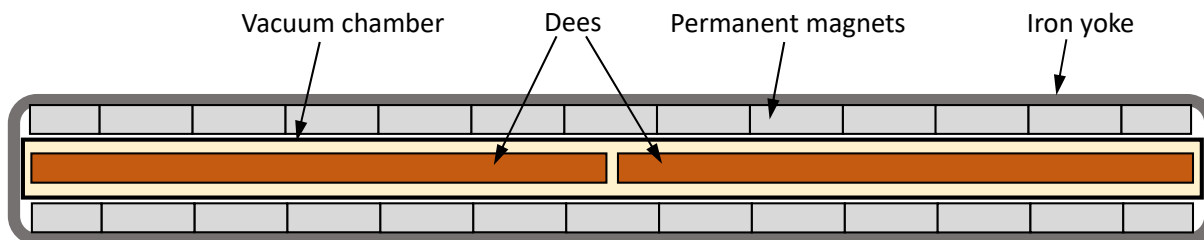


Figure 4-8 Cross-section of the "pizzabox" cyclotron

The following fundamental constants apply:

Rest mass of the proton	$m_p = 1.67262192369 \cdot 10^{-27} \text{ kg}$
Charge of the electron	$q = 1.60217662 \cdot 10^{-19} \text{ C}$
Velocity of light in vacuum	$c = 2.99792458 \cdot 10^8 \text{ m/s}$

We obtain  $f = 22.868 \text{ MHz}$  for the cyclotron frequency and  $E = 9.699 \text{ MeV}$  for the energy of the accelerated protons. The relative velocity of the protons is  $\beta = 0.143782$ .

This is quite impressive compared to the 4.8 MeV output of Lawrence’s first 27 inch (69 cm) cyclotron in 1932, [61].

To check if we violate the assumption that we operate in the non-relativistic regime with proton output velocities much lower than the velocity of light, we calculate the Lorenz factor given by, [61]:

$$\gamma = \frac{1}{\sqrt{1 - \beta^2}}$$

In this case  $\gamma = 1.0105$ , which indicates that we are far from the relativistic regime.

We will also need room for the AC source operating at 22.868 MHz radio frequency (RF). There are four corners of the pizzabox, which are not occupied, and it would be natural to install the RF electronics there.

The power needed to run the accelerator depends on the desired beam current. For a proton beam the power  $P$  is proportional to the beam current  $I$  and the energy  $E$  of the protons:

$$P = \frac{I \cdot E}{q}$$

At 100  $\mu\text{A}$  beam current and  $E = 9.699 \text{ MeV}$ , the beam power is 967 W. This is a reasonable power level for this size of accelerator, but we do not know if this is near the actual required power level. Bob Lazar leaves no details about the accelerator design except that it is a cyclotron, so reasonable performance details are only obtained by a more detailed preliminary design study.

RF generators using state-of-the-art electronics may have an efficiency of converting DC power to RF power approaching 90% in the frequency range of cyclotrons. Then you must add some power to run the supporting electronics, so an overall efficiency of 75% should be realistic. This means that the DC input power to the accelerator would be around 1300 W.

The purpose of the accelerator is to bombard the Moscovium wedge in the center tower with protons. According to Bob Lazar, the protons are absorbed in the nucleus of Moscovium transforming it into element 116, Livermorium. For this to happen the protons must possess enough energy to overcome the Coulomb barrier of Moscovium. The Coulomb barrier the energy required to overcome the mutual electrostatic repulsion between identical polarity charges. The repulsion force becomes stronger the closer you are to the nucleus and the more protons there are in the nucleus, i.e. the Z number of the element.  $Z = 115$  for Moscovium.

For the strong nuclear interaction/force to take over, and absorb the proton into the nucleus, the proton must have enough energy to reach within 1 fm (femtometer,  $10^{-15}$  meter) of the nucleus.

The formula for the Coulomb barrier is, [64]:

$$U_{coul} = \frac{1}{4\pi\epsilon_0} \cdot \frac{Z_1 Z_2 q^2}{r}$$

...where  $Z_1$  and  $Z_2$  are the number of elementary charges of the incoming particle and the nucleus respectively, and  $r$  is the interaction radius, i.e. the separation between the particle and the nucleus.

$\epsilon_0$  is the permittivity of vacuum:  $\epsilon_0 = 8.85418781281 \cdot 10^{-12}$  F/m (Farad/meter)

With  $Z_1 = 1$  and  $Z_2 = 115$ , and  $r = 1$  fm, the Coulomb barrier is:  $U_{coul} = 165.597$  MeV

Now we have a problem. The Coulomb barrier is much higher than the energy of the protons coming out of the pizzabox cyclotron.

To increase the output energy of the cyclotron we can do two things:

1. Increase the diameter of the Dees
2. Increase the magnetic field.

Number 1 option is not possible because Bob Lazar has constrained the size of the "pizzabox". This is certainly a serious matter if we stick verbatim to the 15 or 18 inch dimensions stated by Bob Lazar for the pizzabox. Within these constraints the output energy of the protons would be about halved.

Therefore, we chose option 2. Doing a quick non-relativistic calculation, the magnetic field required accelerate the protons to 165.6 MeV, we need  $B \approx 6.2$  T, but then  $\beta = 0.594$  and  $\gamma = 1.243$ , which is well into the relativistic regime and calculations must be modified to include relativistic effects. The non-relativistic cyclotron frequency  $f = 94.493$  MHz must be divided by  $\gamma$  to get the relativistic cyclotron frequency:  $f_r = f/\gamma = 76.007$  MHz. As evident from these numbers, when accelerating protons to relativistic speeds, their cyclotron frequency decreases as they gain energy, and therefore the continuous operation at a fixed frequency is no longer possible.

A cyclotron operating in the relativistic regime is called a synchro-cyclotron, [61]. The radio frequency must be tuned as the protons gain speed, and this implies that it must operate in pulsed mode on bunches of protons. Every bunch of protons must be accelerated to the output velocity before a new bunch is injected in the center. This greatly reduces the duty factor of the accelerator end hence its average beam current.

A work-around is to build an isochronous cyclotron, [61], in which the magnetic field increases with radius and thus enables a constant cyclotron frequency and continuous operation like the classic cyclotron. However, it is outside the scope of the present report to study this option.

Magnetic fields strengths far above 1.5 T requires electromagnets based on superconducting coils, which grossly increases the complexity and size of the accelerator to include the cryogenic system to cool the coils to the temperature where they become superconducting.

...unless the Zeta Reticulans have developed room temperature superconductors or have produced permanent magnets far stronger than we have here at Earth.

Here on Earth, we neither have materials giving multi-Tesla permanent magnets nor room-temperature superconductors. A comment by Jeremy Corbell, [14] at 00:19:00: *"Our material science is not sophisticated enough. We cannot align atoms in meta-materials in a way to fabricate, replicate and duplicate their physical properties found within these meta-materials"* is certainly true. We have a long way to go developing more sophisticated materials and meta-materials.

A note about superconducting magnets. The bending magnets of the Large Hadron Collider (LHC) at the CERN nuclear research facility in Geneva, Switzerland, creates a magnetic field of 8.3 Tesla, which when they were designed was state-of-the-art. The next generation bending magnets will reach 16 Tesla, [107].

Now leaving this as an open question, there are other peculiarities of the antigravity reactor design that we have to discuss. The protons do not come out of the blue. Protons are ionized hydrogen atoms,  $H^+$ , i.e. hydrogen atoms having been stripped of the lone electron in the atom. Therefore, we must include a flask of hydrogen to feed the cyclotron.

The beam current of 100  $\mu A$  discussed above corresponds to  $6.24 \cdot 10^{14}$  protons per second or  $1.036 \cdot 10^{-9}$  mol per second or 0.03268 mol per year. One mol of hydrogen is 1 gram, so 1 gram of hydrogen should last 30.6 years. So, this is not a showstopper ... and even if we would go for a ten times higher beam current, i.e. 1 mA, 1 gram of hydrogen would last 3 years.

The design of the cyclotron as shown in Figure 4-6 clearly indicates that the output is tangential to the Dees. This gives some headaches w.r.t. the Bob Lazar design. To bombard the Moscovium wedge in the center tower, the protons must be bent towards the center. The bending radius to do this would be half the outer radius of the Dees, and this would require twice the magnetic field strength in a bending magnet compared to the magnetic field of the cyclotron, i.e. 3 T (in the first sketch design). This is not possible with permanent magnets.

The other ridiculous thing about the Bob Lazar antigravity reactor design is the tube shown between the pizzabox and the center tower, guiding the protons towards the Moscovium wedge, cf. Figure 4-1 and Figure 4-2. Firstly, the tube pops out of the "pizzabox" at a distance from the center and orthogonal to the surface, not tangential to the perimeter of Dees of the cyclotron. Secondly, Bob Lazar seems to think that protons behave and flow like water or gas in the plumbing of your house. This is completely insane!! High-energy protons travel in straight lines unless subjected to a magnetic or electric field. In earthly accelerators and beamline installations, very strong and heavy bending magnets are needed to make the protons (or other charged particles) take a curved path.

Another puzzling aspect is that Bob Lazar claims to know that an accelerator is housed in the base of the antigravity reactor and that it is a cyclotron-type accelerator, but he gives no detail. How this information was revealed to the staff at S-4 is not covered by the Bob Lazar story. X-raying the "pizzabox" could reveal its interior design without cutting it open, which according to the Bob Lazar story had been attempted with a laser cutter with disastrous consequences before he started working at S-4. The lack of details by Bob Lazar about the pizzabox accelerator seems questionable, given that he claims to have worked with the accelerator at LANL.

In ref. [61] there is an interesting picture in the section “Advantages and limitations”. This picture shows Lawrence’s 60 inch, 16 MeV cyclotron, where the proton (or deuteron) beam is directed through a thin aluminium foil window into the air, which creates a beam with a distinct bluish glow. This observation is discussed further in Appendix F.

Another headache with the design of the antigravity reactor and antimatter power generation station is how to cold start the system. The accelerator must run to produce high-energy protons, which bombard the Moscovium wedge thus creating element 116 Livermorium, and which, according to Bob Lazar, decays by emitting an antiproton (or two, as sometimes claimed by Bob Lazar), which annihilates with ordinary matter and releases copious amounts of energy in the form of heat, which is converted to electrical power in a 100% efficient thermoelectric generator, again as claimed by Bob Lazar. Only then, there is power available to drive the cyclotron. A start-up battery seems to be needed to cold start the system, but this is not covered by Bob Lazar.

#### 4.5 Antiproton Decay Mode of Livermorium

Bob Lazar describes that the high energy protons produced by the cyclotron in the “pizzabox” base of the antigravity reactor bombard the Moscovium wedge in the center tower of the antigravity reactor thereby transforming element 115 Moscovium to element 116 Livermorium. This reaction is OK, if the protons have high enough energy to overcome the Coulomb barrier of the Moscovium nucleus. Even if it was found in section 4.4 above that this is not the case with the sketched design, we assume that some other technology will allow the protons to reach or exceed the Coulomb barrier energy level. The purported decay of element 116 by emitting an antiproton, however, is ridiculous.

The process would be this, if Bob Lazar’s claim was true:

$$n \rightarrow \bar{p} + e^+ + \nu_e$$

$$\text{Charge conservation: } 0 = -1 + 1 + 0 = 0$$

$$\text{Baryon number: } B = 1 \neq -1 + 0 + 0 = -1 \text{ (violation)}$$

$$\text{Lepton number: } L = 0 = 0 - 1 + 1 = 0$$

$$B - L = 1 \neq -1 \text{ (violation)}$$

where  $n$  is the neutron,  $\bar{p}$  is the antiproton,  $e^+$  is the positron and  $\nu_e$  is the electron neutrino. This neutrino has to be a “normal” neutrino and not an antineutrino in order to conserve the lepton number.

This reaction and the calculation of charge, baryon and lepton number sums on either side of the reaction demonstrates that the charge is conserved, the lepton number is conserved, but the baryon number is violated. Therefore, this reaction cannot take place within the rules of the Standard Model of physics, [49]. These conservation laws are described in references [66], [67], [68].

The reaction that would be allowed according to the Standard Model is:

$$\bar{n} \rightarrow \bar{p} + e^+ + \nu_e$$

i.e. an antineutron decaying as above. This is an ordinary beta decay, [69], in the antimatter world, but we live in the normal matter world, so this cannot happen by itself here.

If a neutron could transmute into an antineutron, the antiproton production could be a two-step process, but an  $n \rightarrow \bar{n}$  process would break baryon number conservation and therefore not be allowed in the Standard Model.

The Standard Model is not the end of physics. There are many aspects of physics that the Standard Model does not cover, [49]. These include:

- Gravity. The Standard model unites the electromagnetic force and the weak and strong nuclear interactions into a common quantum mechanical framework, but not gravity.
- Dark matter. We do not know what it is, but we can see its action on the scale of galaxies.
- Dark energy. We do not know what it is, but we can see that it accelerates the expansion of the universe.
- The matter-antimatter asymmetry. Matter and antimatter ought to have been created in equal amounts in the Big Bang, but matter grossly dominates over antimatter in the universe. We have no explanation to the antimatter deficit.
- Does the proton have a finite lifetime like the neutron? Not according to the Standard model, and proton decay has never been observed despite numerous experiments.
- Neutrino oscillations. The three flavors of neutrinos, Electron, Muon and Tau, change into one another during flight, but this is not covered by the Standard Model. However, there are additional theories which explains neutrino oscillations.
- Neutrino masses. The neutrinos do have mass, but it is extremely small. A recent scientific paper, [58], states that the mass is below  $1.1 \text{ eV}/c^2$ . This is also not covered by the Standard model.

This does not mean that the Standard Model is a failure. On the contrary, it is a huge success, and apart from the items listed above, it has passed with flying colors every test to which it has been subjected.

At some point in the future, the Standard Model will be replaced by another model. The new model or theory must account for anything in the Standard Model and must include one or more of the items above not covered by the Standard Model.

Antiproton production here on Earth is quite another process than purported by Bob Lazar. The CERN nuclear research facility in Geneva, Switzerland, has an antiproton production line, [71], which is used for producing antihydrogen to study the properties of atomic antimatter. Here, antiprotons are produced by shooting 26 GeV protons from the Proton Synchrotron accelerator into a target, typically a copper bar. The extremely hot quark-gluon plasma, at a temperature about  $2 \cdot 10^{12}$  Kelvin, created by the impact allows new particles including antiprotons to be created, so just by this earthly example, it is clear that antiproton production requires quite another setup than purported by Bob Lazar.

#### 4.6 Proton-Antiproton Annihilation and Production of Heat Energy

If we for a moment accept the idea of antiproton decay of element 116 Livermorium created by absorption of a proton in the nucleus of element 115 Moscovium, what would then happen? Bob Lazar claims that the antiprotons are guided by an evacuated tube to a gaseous target (normal matter) in the bottom of the reactor, where the annihilation and production of heat takes place and heat is converted to electricity. This is shown in a sketch of the reactor by Bob Lazar in the movie “The Lazar Tape and Excerpts from the Government Bible”, [138] at 00:22:12.

Anyway, proton-antiproton annihilation is well-known in physics. Its “cousin” process, the electron-positron annihilation, [70], is a very clean process creating two gamma photons at 511 keV travelling away in opposite directions. Proton-antiproton annihilation is a much more complex process due to the fact that protons and antiprotons are members of the hadron family of particles, i.e. composed of quarks (three quarks per proton/antiproton).

The end result is that the annihilation process creates a number of pi-mesons (pions) and K-mesons (kaons), each consisting of two quarks, which share the total mass-energy and momentum of the annihilation. The mesons created will decay further along their own decay chains to photons, electrons, positrons, and neutrinos.

The total released energy will be  $2 \times 938.272 \text{ MeV} = 1876.544 \text{ MeV}$  per annihilation.

Bob Lazar states that there is no radioactivity created by this process. Again, this is rubbish. Radioactivity will be easily detectable unless the setup is extremely well shielded.

Assuming still for moment that the antiproton production is feasible, as claimed by Bob Lazar, and having a 100% efficient process chain, we shoot 165.6 MeV protons at the Moscovium wedge to get the process running, and as an output we get 1876.544 MeV from the proton-antiproton annihilation.

This is a factor  $\approx 11$  gain, i.e. we gain net 10 times as much power out of the thermoelectric generator as we put into the cyclotron. Certainly a nice to have process – if only it was feasible!! ...but it is not.

#### 4.7 Conversion of Heat to Electricity by Thermoelectric Generator

Production of electric power by a Radioisotope Thermoelectric Generator (RTG), [65], using the radioactive decay of an element is well-known in space technology. All NASA probes to the outer solar system have used this technology and recently also the NASA Perseverance rover on Mars, [140]. The early probes include Pioneer 10 and 11, launched in 1972 and 1973 respectively, [80], and the Voyager 1 and 2 probes, launched in 1977, [81].

The energy source in these systems is Plutonium-238,  $^{238}\text{Pu}$ , [65], which is radioactive with a half-life of 87.7 years, and which exhibits an alpha decay mode. Alpha particles as nuclei of helium consisting of two protons and two neutrons. Alpha particles are easy to shield away, so that the fuel pellets become safe to handle. The Plutonium-238 is normally used in the form of Plutonium (IV) oxide,  $\text{PuO}_2$ . The power density of Plutonium is 0.57 watt per gram, i.e. 1 kg of Plutonium produces 570 W of heat. Various types of converters from heat to electric power has been used, [65], both solid-state and mechanical, but contrary to the claims by Bob Lazar their efficiency is far less than 100%, as we have to obey the laws of thermodynamics.

It should be emphasized that Plutonium-238 is NOT the isotope used in nuclear weapons. Nuclear bombs use Plutonium-239, i.e. with one more neutron on board.

Bob Lazar has not revealed any details of the annihilation process and the 100% efficient Thermoelectric Generator in the Sports Model flying disc.

The only information given by Bob Lazar, which is very strange as many other claims purported by him, is that the antiprotons are guided to the bottom of the tower, [7] page 7-5, where they annihilate with protons in a gaseous target and are converted to electricity at 100% efficiency. Firstly, when the nuclei of a radioactive element decay, the decay products (in this case the antiprotons), fly away in random directions. There is no memory in the nucleus of the direction of the incoming proton. Guiding the antiprotons to the bottom of the tower would involve capturing them, regardless of their direction, and guiding them through a high-vacuum beam line to the target by electric and/or magnetic fields.

If the gaseous target was the atmosphere inside the tower, there could be some reason in his statement, but then we would have to check if the range of the antiprotons in the gas allowed them to annihilate in the gas before they hit the tower wall. All this is speculation.

The question is also how large a fraction of the antiprotons created, as claimed by Bob Lazar, actually succeed in leaving the Moscovium wedge instead of annihilating inside the Moscovium material. Again, conditioned on the feasibility of the claimed antiproton decay mode of Livermorium.

Bob Lazar gives no details about the operation of the thermo-electric generator or how the electricity is distributed in Sports Model the flying disc, except that there is no wiring, neither for power distribution nor for signaling, [4] at 00:13:10.

#### 4.8 The Gravity Amplifiers and Emitters

According to Bob Lazar, the antigravity reactor does not itself produce the propulsion. On the flight deck, there are three gravity amplifiers and underneath them, the gravity emitters, [4] at 00:34:35. The gravity amplifiers are boxes or cylinders, 4 feet (122 cm) high and 2 feet (61 cm) across. They are suspended on the top and they can pivot with two degrees of freedom to produce various configurations of antigravity field. This is described in some detail in the boblazar.com website, [11].

No details about the design and construction of the gravity amplifiers and emitters have been identified in any of the sources of the Bob Lazar story. Therefore, no further analysis is made.

#### 4.9 The Gravity Waveguide

Waveguides for electromagnetic waves are well-known and much used in microwave technology for low-loss connections between e.g. a radio transmitter and the antenna. The electromagnetic wave is completely confined within a tube with a rectangular, circular or sometimes elliptical cross-section and made from copper, [72]. This is possible because electromagnetic waves cannot penetrate an electric conductor but is reflected from the surface like a mirror. In the rectangular waveguide, the wave can propagate if the broad dimension of the rectangular cross-section is larger than half a wavelength of the electromagnetic wave. Waveguides with a circular cross-section are also commonly used.

There are also dielectric waveguides which include optical fibers, [73]. They function by the principle of the velocity of light being lower in the dielectric medium than in vacuum, i.e. the medium has a refractive index  $n$  larger than unity. The optical fiber consists of a circular core with a certain refractive index and the cladding with a lower refractive index than the core. The light wave is then trapped inside the core and cannot escape. The velocity  $v$  of light in a dielectric medium is  $v = c/n$ . The electromagnetic waves, confined inside an optical fiber, propagate over very long distances with very little loss.

In the antigravity reactor design as claimed by Bob Lazar, a gravity waveguide is attached to the top of the hemisphere, cf. Figure 4-1. The gravity waveguide exits through the top of the cockpit roof.

Could gravitational waves be confined within a sort of waveguide? To accomplish this, we would need a material that reflected gravitational waves, and that the wavelength of the gravitational wave would satisfy a similar wavelength condition as for the electromagnetic waveguides – or – it could be a material in which gravitational waves propagate with a lower velocity than in vacuum so that you could produce a gravitational wave equivalent of the optical fiber.

Gravity is known to be a force, that penetrates both vacuum, and any kind of matter and the entire Universe for that sake. It cannot be shielded away, it cannot be reflected. This is true both in terms of classical Newtonian physics and the General Theory of Relativity. Gravitational waves propagate at the velocity of light in vacuum, cf. section 4.2, and is not retarded by passing through matter.

With Earthly physics, a gravity waveguide is nonsense!!

#### 4.10 Controlling the Flying Disc

Bob Lazar has stated on several occasions, e.g. ref. [5] at 00:34:00, that there are no flight controls in the disc, Yet he claims that there has been, and that he has witnessed test flights

of the Sports Model flying disc conducted by the S-4 personnel. However, he has made no statement on how this could take place, when there are no flight controls.

Bob Lazar also claims that the S-4 test pilots inside the disc communicated with the ground staff via VHF radio, [4] at 00:44:00. How could this take place when it is stated that “light bends around the disc” when viewed from below, [4] at 00:44:35. If the antigravity field created by the reactor is strong enough to warp time-space so that light (and radio waves) bends around the disc, how could the S-4 ground staff then communicate with the test pilots via VHF radio?

#### 4.11 Comments on Other Sources and Assessments of the Antigravity Principle

There are many comments on the Bob Lazar Story on the Internet, but one notable entry in addition to the entries by Tom Mahood, [17], [18], [19], is by Dr. David L. Morgan, [111], himself a nuclear physicist.

I endorse most of his analysis, but it is rather superficial and in certain aspects misleading. This will be discussed below.

A bit down from the beginning of his treatise Dr. Morgan talks about the antigravity field created by the antigravity reactor in the flying disc and warping spacetime. He states that *“If Mr. Lazar had really distorted spacetime like this back in his “Area 51” lab, every object on the face of the Earth would have rushed into New Mexico”*. It is strange that Dr. Morgan places Area 51 in New Mexico, when everybody knows that it is located in the state of Nevada. Maybe Dr. Morgan had Los Alamos National Laboratory, which lies in New Mexico, in his mind when writhing this statement, but it is wrong anyway.

A bit further down Dr. Morgan states: *“There are serious scientists that do serious work on wormholes and warp bubbles and other mechanisms which could allow faster-than-light travel by taking advantage of distortions in spacetime. As this research stands right now, it seems clear that the energy requirements which would be required by this kind of travel are unimaginable by any standards – even the most fanciful extrapolations of alien technology”*.

Dr. Morgan gives no reference, but I suspect that he is thinking of the “Alcubierre Drive”, [84], an intriguing solution to Einstein’s General Theory of Relativity, published in 1994. The treatise by Dr. Morgan was written in August 1996 and revised in April 2001, so the timing would be right. See also section 4.13 for a discussion on the feasibility of warp drives

About 2/3 down the treatise, Dr. Morgan states: *“Heavy elements – all elements heavier than iron – are not formed during the normal life cycles of stars. The only time when these nuclei are “cooked” is during the collapse and subsequent explosion of supernovae. The supernova explosion then spreads heavy elements throughout the galaxy”*. Dr. Morgan does not seem to be aware that the very heaviest elements are not created in supernova explosions, but rather in neutron star mergers. Only in the case of neutron star mergers we can expect that the neutron density and temperature conditions are sufficient for reaching the elements in the  $Z = 100$  to 120 range. The nucleosynthesis process of element 115 Moscovium and other super-heavy elements is discussed in detail in section 4.3.2.

My main objection against the analysis by Dr. Morgan is his way of dismissing the antiproton decay mode of Livermorium and the energy production by annihilation.

Dr. Morgan states that to create an antiproton you would need the rest-mass energy of a proton i.e. 938 MeV and that you would gain the same amount of energy when the antiproton annihilated with a normal proton. This corollary is wrong. If you could create an antiproton by 938 MeV of energy, you would gain  $2 \times 938 = 1876$  MeV when the antiproton annihilated with a normal proton. This would imply a net energy gain of 100% or a factor 2 in the process.

At the end of his treatise, Dr. Morgan discusses pair production of protons/antiprotons like we know it from pair production of electrons/positrons. However, with protons/antiprotons the process is much more complex due to their quark constituents, but in theory it is possible, [99].



At this point he also seems to get the energy budget right: 2 x 938 MeV energy input creating a proton/antiproton pair and 2 x 938 MeV energy output when they annihilate, i.e. net zero energy gain.

Dr. Morgan completely ignores the hypothetical possibility of an antiproton decay mode of element 116 Livermorium, which I discuss in section 4.5 and demonstrate is impossible as the Baryon number conservation is violated in this process.

In the real world, creation of antiprotons requires much more energy per particle as discussed in section 4.5.

There is also another article entitled “A Comparison of Bob Lazar to Interstellar Travel: Spacecraft Technical Operations”, which claims to provide insight in the technology described by Bob Lazar, [100]. This article is from a website <http://www.grantchronicles.com>. The article opens with some sensible physics considerations, but not very far down the text it turns into what I would denote mind-blowing pseudo-physics bullshit conspiracy talk!! No less. The rest of the articles on the website is of the same sort. The only interesting piece of information from this site is that it mentions Bob Lazar’s notion of Gravity A and B together with a copyright statement at the bottom dated 2002 and 2007. If the 2002 version of this article also mentioned Gravity A and B, this could point to the link between Bob Lazar and Kenneth F. Wright who met first time in year 2000. However, it has not been possible to retrieve the 2002 version.

This neither proves or disproves that Bob Lazar got his idea of “Gravity A” and “Gravity B” from Kenneth F. Wright. Mr. Wright states, cf. Appendix G, page 91, that he worked for twenty years on his “Nuclear Gravitation Field Theory” before publishing it in 2000, while Bob Lazar talked about “Gravity A” and “Gravity B” already in his 1991 video lecture, [138] at 00:10:05. So was there a link between Kenneth F. Wright and Bob Lazar already in 1991, or are the similarities just a coincidence ???

#### 4.12 Overall Assessment of the Antigravity Reactor Design

At first sight and by the eminent storytelling knack of Bob Lazar, the antigravity reactor appears very plausible, conditioned on your acceptance of the claimed alien origin, and the alleged super-advanced technology possessed by such a civilization.

However, you need not dig very deep into the details of the physics involved before you run into severe trouble.

The core of the reactor, element 115 Moscovium, is deeply troubled. Even if a stable isotope of Moscovium exists and has been synthesized in nearby neutron star mergers before or during formation of our solar system from its primordial cloud, it has not been identified neither here on the Earth nor in cosmic rays despite the use of extremely sensitive analysis methods.

The cyclotron accelerator claimed by Bob Lazar to be installed in the “pizzabox” base of the reactor seems to be feasible with some reservations, but when it comes to the 165 MeV proton energy required to overcome the Coulomb barrier of Moscovium, my sketched design falls way short of reaching this energy level with current permanent magnet technology. Imagining a room temperature superconductor may allow the required magnetic field strength to be reached, but there are probably other obstacles not covered in my analysis.

Assuming that when Bob Lazar states that the accelerator in the base is a cyclotron, the tube or beam line shown in the drawings and scale model by Bob Lazar to guide the high-energy protons to the Moscovium target, is childishy ridiculous. As pointed out in section 4.4 the cyclotron output is tangential to the outer perimeter of the dees, and curving the protons back to the tower in the center of the pizzabox would require twice the magnetic field of the cyclotron itself. Again, a completely ridiculous and non-physical design by Bob Lazar.

The purported antiproton decay mode of element 116 Livermorium, created by the bombardment of Moscovium with high-energy protons is forbidden by the Standard Model of physics, and such a decay mode has never been recorded.

Then there is the thermoelectric generator. The antiprotons claimed by Bob Lazar to be created by the decay of Livermorium are guided to a gaseous target where they annihilate with normal protons and generate heat, which is converted to electricity at 100% efficiency. The details of the gaseous target are missing. It is stated that the gaseous target is at the bottom of the reactor, which must be at the bottom of the “tower”, cf. Figure 4-2. There is nothing in the Bob Lazar story saying that the tower is evacuated. Anyway, guiding the antiprotons would require a beam line of extremely high vacuum to prevent unintended annihilation, and also focusing magnets to prevent the beam from scattering and hitting the walls. None of this is documented by Bob Lazar. Finally, even if our present technology for thermoelectric generators has poor conversion efficiency, this may improve with progress in materials science, but reaching 100% will, as Bob Lazar correctly points out, violate the laws of thermodynamics.

The gravity amplifiers and emitters are poorly documented in the Bob Lazar story and I will leave this topic to others. Analyzed within the physics of the Standard Model, the antigravity reactor purported by Bob Lazar is gibberish. Further, the knowledge of modern physics demonstrated by Bob Lazar is very deficient, which severely detracts his credibility.

Finally, it should be mentioned that a warp drive creating a very intense gravity field around the craft, bending light, would disturb the entire environment and probably in the special case of the LIGO gravitational wave observatories, knock the mirrors of the interferometers off their supports !!! This could of course not have happened in 1988-89 when Bob Lazar was witnessing test flights at S-4, as the LIGO detectors were not built at that time. See also ref. [106].

#### 4.13 Warp Drives

Why talk about “warp drives”, a common concept in science fiction literature and movies? Well, Bob Lazar’s antigravity drive is in fact a kind of warp drive. According to the Bob Lazar story, it allows the Zeta Reticulans to shuttle between their home planet and the Earth and other planets at superluminal speeds, i.e. faster than light space travel. This is perfectly what a warp drive would allow. Does this concept, without indulging to the Bob Lazar story, have any foundation in current physics? Does it violate Einstein’s General Relativity Theory?

In 1994, Mexican physicist Miguel Alcubierre proposed a solution to the General Relativity theory (GR), [108], allowing a warp drive to be created and allowing faster-than-light travel, albeit with some unrealistic requirements such as manipulating amounts of matter many orders of magnitude larger than the entire mass of the universe, and the non-physical concept of negative mass and negative energy.

It should be noted here that Einstein’s famous equation  $E = mc^2$ , defining the equivalence between mass  $m$  and energy  $E$  ( $c$  is the velocity of light) also holds for negative  $m$ . Negative energy would thus be equivalent to negative mass and have negative gravity or antigravity and would expand spacetime.

The movie series Star Trek from 1979 and onwards, [146], is probably the foremost media promoting the warp drive concept, even if the notion date back to 1957 in the science fiction novel by John W. Campbell: “Islands of Space”, [147]. When Captain Jean-Luc Picard, commander of the Star Trek spaceship USS Enterprise, orders: “Warp one, engage!”, stars become stripes of light, and light-years are covered in little time.

Even if the Alcubierre solution involves physically unrealistic requirements, it is worth taking a look at Figure 4-9, which illustrates the concept. Even if the Alcubierre solution is described as a warp bubble, it is not immediately evident from Figure 4-9 that this is the case. However, Figure 4-9 is a projection into 2D space of the Einstein 4D spacetime. The third dimension is

used to illustrate the contraction or expansion of spacetime. If the flat circular area is the xy-plane, then the z-axis indicates the level of spacetime contraction or expansion. This is similar to the familiar rubber diaphragm illustration of spacetime contraction around large, massive objects, e.g. the sun and planets in orbit around it. This means that the heavy sun would make a deep dent in the rubber (creating a gravity well) while the planets would make more shallow dents.

In the Alcubierre drive, spacetime contracts at the front of the bubble (right), and expands behind the bubble (left), corresponding to a warp in spacetime. Inside the bubble, spacetime is flat. The circular area in Figure 4-9 is therefore actually a spherical region of 4D spacetime.

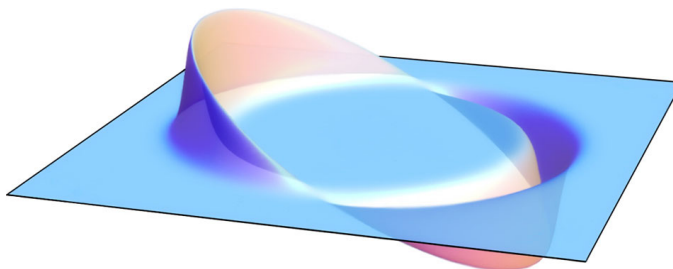


Figure 4-9 Principle of the Alcubierre Warp Drive

Credit: AllenMcC, Wikimedia, [142].

The challenge of Alcubierre’s warp drive is the upward going dent in the “spacetime rubber sheet”. This implies that we are dealing with a negative mass/energy that would expand spacetime instead of contracting it like ordinary matter.

Another way of illustrating the warp bubble is shown in Figure 4-10. Here the undistorted spacetime is shown as a regular square grid, while spacetime contracts in front of the spaceship (right) and expands behind the spaceship (left), here the outline of the Star Trek USS Enterprise.

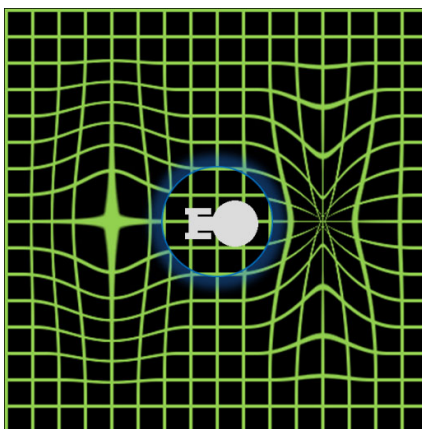


Figure 4-10 Illustration of a StarTrek warp bubble

Credit: Trekky0623 at English Wikipedia, [147]

How does superluminal travel correspond with Einstein’s relativity theories, which state that no physical body can be accelerated beyond the velocity of light? With the warp drive it is the

distortions or deformations of spacetime itself that travel at superluminal speed, which is entirely within GR. This is similar to the inflationary phase of the universe after big bang terminating at about  $T_0 + 10^{-32}$  seconds, where the universe expanded at wildly superluminal speed.

In 2020 an alternate solution was published by Alexey Bobrick and Gianni Martire, [109], which eliminates the non-physical issues with the Alcubierre solution and maintains the concept within known physics, albeit out of reach with current technology. A popular science account of this concept is given in ref. [110]. The Bobrick & Martire concept, however, does not allow superluminal travel.

In March 2021 Erik W. Lentz of the University of Göttingen, Germany, published a new solution to the GR field equations, [143], which eliminates the non-physical requirements of negative mass and energy and reducing the energy requirements drastically although still out of reach with current technology. Popular science accounts of Lentz' work are given in [154] and [150]. The solution by Dr. Lentz allows superluminal travel and can be configured so that tidal forces within the warp bubble are minimized, so that time is flat inside the bubble and matches the time outside thus avoiding the "twin paradox". This paradox is a well-known effect of a person travelling at relativistic speeds, which will age more slowly than his or her twin staying back on Earth.

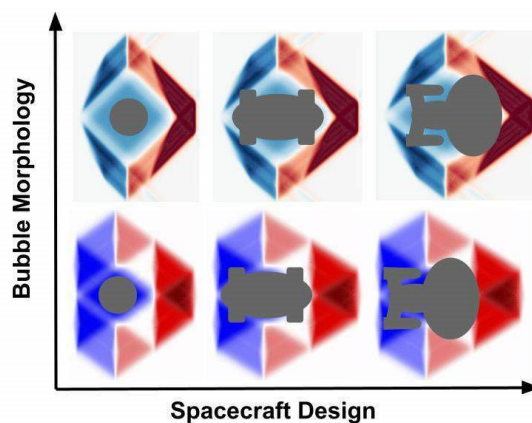


Figure 4-11 Configurations of spacetime for warp bubbles by Erik Lentz, [150]

According to Dr. Lentz, his solution requires a mass-energy comparable to about a tenth of a solar mass, which is not as outrageous as the requirements of Alcubierre's solution, although still far beyond current technological reach.

In physical/technical terms, the "warp bubble" is actually what is termed a "soliton". A soliton or solitary wave is a wave packet that keeps its shape while propagating at constant velocity in a medium, [151]. The material that would be required for implementing the "warp bubble" soliton is an incredibly dense plasma arranged as shown in Figure 4-11, probably something like the material of a neutron star. Again, this is far beyond current technology. Dr. Lentz speculates that neutron stars may be ejecting "warp bubbles" like described in his paper, [142]. If this would be the case and they were detectable, this could be important observational evidence for the feasibility of warp drives. This may be farfetched, but anyway intriguing.

Negative energy, though at first thought impossible, is actually within reach due to a quantum mechanical effect, the so-called Casimir effect. The Casimir effect is a physical force acting between e.g. two metal plates separated by a tiny distance. This force is caused by fluctuations of the quantum electromagnetic field, [152]. In a setup manifesting the Casimir effect, the so-

called zero-point energy has a negative value. This energy is proportional to inverse of the separation cubed of the metal plates. For physically realizable separations the energy comes out vanishingly small. To get a tangible value, the separation must be comparable to the radius of an atom i.e. about 100 pm ( $10^{-10}$  meter). At this separation the zero-point energy  $\langle E \rangle = -433.753 \text{ J/m}^2$ , and even this is far far below the requirement of an Alcubierre warp bubble. To reach something that could be used in a warp drive, you would have to expand the area radically, reduce the separation radically and probably use a multi-layer structure with maybe millions or billions of layers. Nanotechnology, i.e. manipulation matter at the nanometer ( $10^{-9}$  meter) scale is a mature technology, but going to “picotechnology” at the picometer ( $10^{-12}$  meter) scale or smaller is still far beyond current capabilities.

The papers by Dr. Lentz, [143], and by Bobrick & Martire, [109], has stirred quite a controversy among GR physicists. A discussion between the two parties is outlined in Dr. Lentz’ personal website blog, [154]. A paper by Alcubierre and Lobo, [153] which was published near simultaneously with Dr. Lentz’ paper deals with some challenges of warp drive in terms of violations of classical energy conditions and the fact that the warp bubble solutions to the GR field equations imply that the crew inside the bubble cannot control the bubble and thus their travel. This is a serious issue, which has not yet been solved. Other contributions include papers by Fell & Heisenberg, [145] and by Santiago, Schuster & Visser, [148]. A 1998 paper by prof. Ken Olum, [155], states that superluminal travel do require negative energies, and this caused a controversy with Dr. Lentz, who maintains that his warp drive works with only positive energy. And there are many other papers, as listed in the references sections of the above papers.

Even if research in warp drives is just tiny corner in the research in GR and related items such as quantum gravity, the paper by Erik W. Lentz seems to have stirred an interest among physicists, so warp drives may now be considered an independent field of research. Even if this research does not lead to a recipe for a physical warp drive, it will at least provide a test of the limits of GR theory. Hopefully, the theoretical research in warp drives will lead to results that can be subjected to experiments, even if they do not directly lead to implementing a warp drive.

So, despite the enormous challenges developing a warp drive, maybe there is hope sometime in the future for earthlings to travel in the universe with a warp drive after all.

In the words of captain Jean-Luc Picard in the “The Next Generation” episode of Star Trek: *“Things are only impossible until they’re not”*.

Nelson Mandela made a similar statement: *“It always seems impossible until it’s done”*.

## 5 Recap

### 5.1 Pros and Cons of the Bob Lazar Story

There are a few pros and many cons to the Bob Lazar story. An attempt to make a listing is presented below.

#### PROs

1. Bob Lazar's story is very detailed and very consistent, when told in various media appearances. There are a number of inconsistencies, but this is expected from a complex personal experience when told many times over. If the story was 100% consistent one would suspect it to be a construct. Yet the story contains several gross inconsistencies, which does not seem to be just memory shortcomings. These are discussed below.
2. Bob Lazar states that he is a scientist/physicist, and he talks like one. At least as a superficial first impression, but scrutinizing what he says and what he does not discuss leaves another impression, which is analyzed in items 5, 6 and 7 below.
3. It is shown in the interview with George Knapp, [21] at 00:10:20, that Bob Lazar was subjected to several polygraph tests, and that the conclusion on the second series of tests, [14] at 00:10:50, is that Bob Lazar made no attempt to deceive. However, one of the other examiners analyzing the same test results concluded that Bob Lazar might convey information that he learned from someone else. See also item 12 below.

#### CONS

1. Bob Lazar's messy life in the 1980's with his bankruptcy, his wedding/divorce record, embellishment of the performance parameters of his jet-engine car, his criminal sentences for pandering and trading illegal chemical substances does not lend credibility to anything coming from Bob Lazar. See ref. [17] for details.
2. The missing diploma from universities. It is truly astounding that nothing can be found. The most likely conclusion based on the investigations by Tom Mahood, [17], George Knapp, [6] at 00:06:00, and others, is that such documents never existed, and that Bob Lazar has no academic degrees.
3. The non-existence of scientific publications authored by Bob Lazar. Despite a comprehensive search in both open media and scientific databases, nothing was found.
4. The physics of the purported antigravity reactor drive of the Sports Model flying disc is in violation of current physics in so many areas, that the description by Bob Lazar has little credibility. A detailed analysis of this is the topic of chapter 3 and 4.
5. Many sticks to the belief that Bob Lazar "discovered" element 115 Moscovium. This is not the case. In the 1970's and 1980's the super-heavy elements around the double-magic element 114 Flerovium (114 protons and 184 neutrons in the nucleus) were assumed via nuclear physics theory to constitute an "island of stability", with slow or no radioactive decay. It was just a question of time when scientists would succeed synthesizing these elements. A paper from 1971, [54], analyzes the properties of the super-heavy elements from 102 to 184 using nuclear physics. Bob Lazar could have known about the super-heavy elements and the island of stability based on an article in Scientific American, May 1989, [39], around the time he stopped working at S-4. Bob Lazar's first media appearance under his own name was in November 1989 at KLAS-TV interviewed by George Knapp, [6] at 00:05:15. This would allow Bob Lazar to construct the story about element 115 based on the Scientific American article and, as I conjecture, the knowledge of US Patents 3,626,605 and 3,626,606 from 1971, which describes an antigravity drive, cf. details in

- Appendix J. However, Bob Lazar does not mention element 115 in the KLAS-TV interview, so this appears to be a later augmentation.
6. In the Joe Rogan Experience #1315, [5] from 00:25:30, the use of element 115 as a fuel in the antigravity drive is discussed. At 00:25:45, Joe Rogan asks when element 115 was first produced. Bob Lazar doesn't remember it and asks Jeremy Corbell: "Do you remember when...". Jeremy Corbell: "2004, Darmstadt Germany ...". And this is wrong. It was discovered/synthesized by a collaboration between the Joint Institute for Nuclear Research (JINR) in Dubna, Russia and Lawrence Livermore National Laboratory (LLNL), California in 2003), [85]. It is astounding that Bob Lazar does not have this crucial piece of information in his memory. If anybody on this planet has talked far and wide about element 115, and its use as the active element in an antigravity reactor and propulsion system, it is Bob Lazar, and he doesn't even know when it was first synthesized.
  7. In the Joe Rogan Experience episode #1315, [5] at 01:04:10, Jeremy Corbell states "*Bob, they announced gravity as a wave. you were right. You are vindicated*". The implication that Bob Lazar predicted gravitational waves is bullshit. Gravitational waves were proposed by Henri Poincaré in 1905 and subsequently predicted in 1916 by Albert Einstein as a consequence of his General Relativity theory, [45]. Further, in the discussion that follows, Bob Lazar talks about the gravitational wave detector (LIGO), but he demonstrated very little knowledge about this unique facility and the first discovery of gravitational waves in 2015. It seems very strange for a purported nuclear physicist not to show more insight in this breakthrough event. Finally, at 01:05:50, Bob Lazar states that "*In the eighties the predominant theory was that gravity is produced by gravitons, theoretical particles. They are not, they are waves, they are not particles*". Gravitons have been discussed since 1935 as the mediators of gravity, like photons are mediators of the electromagnetic force, [46]. Gravitational waves and gravitons have been discussed concurrently in the physics community for decades. Gravitons, if they exist, would allow gravitation and General Relativity to be included in the quantum mechanical framework, thus uniting all four forces of nature into an all-embracing "Theory of Everything". Despite huge theoretical and experimental efforts, gravitons have not yet been discovered, and the "Theory of Everything" is still unresolved. See also discussion in section 4.2.
  8. Bob Lazar claims that element 115 Moscovium when bombarded with high-energy protons in the antigravity reactor transforms into element 116 Livermorium, which subsequently decays by emitting an antiproton. Such a decay mode does not exist, as it breaks the conservation laws of nuclear physics reactions. This is detailed in section 4.5. Further, a free antiproton released in normal matter will likely annihilate immediately with a proton in the Moscovium material in a cascade of high-energy nuclear reactions releasing twice the energy of the proton:  $2 \times 938$  MeV. The heat from this energy release could of course be converted into electricity, but the cascade of high-energy particles produced would be easily detected outside the reactor. Bob Lazar has neither demonstrated any detailed knowledge about nuclear reactions, nor has he tried to justify why element 116 Livermorium could have this extremely special decay mode, not found elsewhere.
  9. In the Joe Rogan Experience episode #1315, [5] at 00:07:28, Bob Lazar talks about his first visit to the hangar with the Sports Model flying disc, Bob Lazar tells that he was reprimanded immediately when touching the disc and was intimidated by the armed guards, but neither in the Bob Lazar movie [4], nor in the interview with George Knapp, [6]. I suppose that alone touching an alien flying disc and moreover getting reprimanded and intimidated by a gruff security guard wearing an M16 assault rifle or similar weapon would leave a deep and lasting impression in a civilian. Therefore, it seems suspicious that Bob Lazar does not include this episode in every interview.
  10. Bob Lazar claims on several occasions that he has had no personal gains from telling his story. This is not entirely true. He seems to make a business out of it via his company



- United Nuclear Scientific Supplies, <https://unitednuclear.com/>. He sells posters with his personal sketch of the Sports Model flying disc, even a limited-edition hand drawn, deluxe printed poster with his personal signature at USD 89.00 (sold out, but in preprint again), [40], coffee mugs with the Sports Model flying disc, and a T-shirt showing element 115 denoted “Lazarium”. It also seems probable that the general revenues from his shop gain significantly from his fame as Mr. Flying Disc. In the Bob Lazar movie, [4], footage with Bob Lazar working in his shop, [4] from 00:28:15, reveals several employees, which would not be possible if United Nuclear was a poor business.
11. The personal gains from the Bob Lazar flying disc story according to Tom Mahood, [18], is that it was a convenient cover-up to get out of the claws of the military system of justice, and prevent him from being put to jail, charged with revealing classified tests of particle beam weapons over Area 51. The flying saucer story was harmless to the military, and they realized that the risk of revealing the classified particle beam weapons program was imminent if Bob Lazar was prosecuted. In the interview at KLAS-TV reporter George Knapp states that Bob Lazar went public with the story about the flying discs in order to protect himself, [6] at 00:05:35. This is in line with the particle beam weapons hypothesis by Tom Mahood, but obviously different from Bob Lazar’s own justification.
  12. Polygraph (lie detector) tests seem to be very popular among US federal government agencies and some police departments, [48]. However, in Europe and elsewhere polygraphs are generally not considered reliable evidence, [48]. It is also cited in ref. [48] that *“The Supreme Court summarized their findings by stating that the use of polygraph was little better than could be obtained by the toss of a coin”*. Therefore, I find that polygraph tests are useless in proving or disproving if a person speaks the truth or lies.

## 5.2 Constructing the Bob Lazar Story

If we assume that the Bob Lazar story about his engagement with S-4 reverse engineering the antigravity propulsion system of an alien flying disc is a construct, then it is worth diving into an analysis of how he could have put the details together.

In addition to the obvious flying disc allegedly held in custody by the US military, there are some key facts that comprise the framework of the Bob Lazar story:

### 1. **Element 115 Moscovium and its antigravity properties**

The May 1989 article in Scientific American: “Creating Superheavy Elements”, [39], by Peter Armbruster and Gottfried Münzenberg from the GSI Helmholtzzentrum für Schwerionenforschung in Darmstadt, Germany, came out conveniently timed for the Bob Lazar Story. In the first media appearance by Bob Lazar at KLAS-TV in May 1989 where Bob Lazar on the cover name “Dennis” was interviewed by George Knapp, [6] at 00:04:45, his story was not very detailed. In the same video in the November 1989 interview by George Knapp there is much more detail. During the six months between the two interviews, Bob Lazar would have had plenty of time to refine the details. Exactly when element 115 became part of the Bob Lazar story is uncertain. It was not part of the story in the George Knapp interview, [6], at least not in the version available on YouTube. To construct the story about the elusive element 115 and its purported antigravity properties, Bob Lazar would need to know about this element and combine it with purported antigravity properties of its homologue element 83 Bismuth as claimed in U.S. Patents 3,626,605 and 3,626,606, which are discussed in Appendix J. These patents date from December 1971, so they would be readily available at the time of Bob Lazar’s engagement with S-4.



## 2. Gravity A and Gravity B

The concept of Gravity A and B is similar to the “Nuclear Gravitation Field Theory” by Kenneth F. Wright, [8], [9], but it seems that his theory was not published until 2000, [10], 10 years after the engagement of Bob Lazar at S-4. Bob Lazar and Kenneth F. Wright seem to be friends, judging from ref. [7], but their first meeting is stated to be during the Memorial Day weekend 2000 (May 27-28, 2000), [7] page 3-12. This in line with what appears to be the first version of the “Nuclear Gravitation Field Theory”, [10], but is 11 years after Bob Lazar was sacked from S-4. However, ref. [7] bears a copyright date April 10, 2000, which is before the meeting, and the PDF file metadata dates the creation of the file to April 18, 2021. This is puzzling.

Bob Lazar actually mentioned “gravity as a wave” in the George Knapp interview at KLAS-TV, [6] at 00:08:05: “...they use gravity as a wave using waveguides, almost like microwaves”. I first thought that the purported concept of Gravity A and Gravity B was due to the contact between Kenneth F. Wright in 2000, but Bob Lazar talks about this concept already in his 1991 “physics lecture” video, [138], cf. Appendix E, preceding the contact with Kenneth F. Wright by nine years. So, Bob Lazar must have invented this concept himself. See also sections 4.2 and 4.11.

## 3. Cyclotron accelerator in the “pizzabox” base of the antigravity reactor.

Bob Lazar was familiar with accelerator technology from his work at LANL, so even if the cyclotron was invented at University of California, its principles would be known by any accelerator physicist and that would also reach Bob Lazar, even if he was only an accelerator technician. The cyclotron is the only compact high energy proton accelerator, which one could imagine built into the base of the antigravity reactor in the 1980'ies.

## 4. Antiproton decay of element 116 Livermorium created by proton bombardment of element 115 Moscovium.

The total conversion of mass to energy by annihilation of normal matter and antimatter has been known in physics for nearly a century, beginning with a paper by Paul Dirac in 1928 which proposed the existence of antimatter in the form of anti-electrons, named positrons in 1932, [87]. How Bob Lazar got the idea of an antiproton decay mode of element 116 Livermorium is not so obvious. However, it is a very simple and practical way of generating copious amounts of energy for conversion into electricity, see below, leaving out the cumbersome physical details. Just a pity, that it violates established physics.

## 5. The thermoelectric generator at 100% conversion efficiency

Thermoelectric generators are based on the Seebeck effect discovered in 1821, [88]. They have been used in interplanetary probes like the NASA Pioneer 10 and 11 and Voyager 1 and 2, [65]. The source of heat is a Plutonium-238 isotope. However, the thermoelectric generators realized by current technology have conversion efficiencies far below 100%, i.e. 5–8%, [89].

## 6. The gravitational waveguide.

It is not obvious why there should be a gravitational waveguide on top of the antigravity reactor protruding through the top of the craft. If the idea is to conduct the antigravitational wave to the gravity amplifiers on the same deck as the antigravity reactor, cf. Figure 3-3, there should rather be three waveguides horizontally out to the gravity amplifiers. However, Bob Lazar does not give detail to this feature.

## 7. The gravity amplifiers and emitters.

This is one of the more obscure topics. There is very little detail about the design and technology of the gravity amplifiers and emitters in the Bob Lazar story. Maybe he needed to construct something that could lend credibility to the maneuverability of the

craft and its ability to cover lightyears distances, when the heart of the propulsion system is just a tiny antigravity reactor in the center of the craft. This is speculation from my side.

8. **The bending of light around the craft.**

Bending or “warping” of light around an antigravity drive is well-known in science fiction literature.

9. **The “no wiring” and “no flight controls” in the flying disc.**

A big wiring harness in an aircraft or spacecraft is a mess and prone to failures, and an advanced civilization like the Zeta 2 Reticulans would of course have found ways of eliminating this, but Bob Lazar gives no details of what has replaced the harness.

10. **The “greys”, i.e. the child-size aliens.**

This style of aliens are well-known in UFO-lore and science fiction literature.

In ref, [4] at 00:34:20, George Knapp states in a discussion with Jeremy Corbell that:

*“...they showed him (Bob Lazar) alien bodies ... broken down so that you could see their organs ...”*. If this is true, Bob Lazar have seen a deceased alien. However, further down, at 00:47:00, the discussion about Bob Lazar having seen *“two guys looking down and talking to “something small, which long arms”* (a child-size alien ?), Jeremy Corbell explicitly asks if Bob Lazar has seen an alien and he replies: *“No, it was probably a doll”*. So there is a discrepancy here, and what is the truth, if any ???

11. **The home of the aliens at the fourth planet in the Zeta 2 Reticuli star system.**

The alleged abduction of Betty and Barney Hill in September 1961, [93], was claimed to be carried out by aliens from the Zeta 2 Reticuli star system 39.27 lightyears away. This event became widely discussed in popular media during the 1960'ies and 1970'ies and several books have been published about this event. It would be obvious for Bob Lazar to use this reference. See also discussion in Appendix G.

### 5.3 Conclusion on the Bob Lazar Story

The Bob Lazar story is very exciting, and he has gained many believers. The story is very cleverly and consistently put together and has a lot of technical detail. However, if you do an in-depth analysis of the story, it does not hold tight. If you dig deep, there are too many inconsistencies and incorrect physics in the narrative to justify any level of trustworthiness of the Bob Lazar story. As a purported scientist/physicist, he has never demonstrated any deep knowledge of nuclear physics, and he has never published a scientific paper.

Even if we accept that we are dealing with a very advanced civilization who is technologically far ahead of humankind, and we therefore have a hard time accepting what is before our eyes (or at least what was before the eyes of Bob Lazar and colleagues at S-4), the evidence is too scarce, there are too many inconsistencies and there are too many violations of current, well-established physics in the story.

In a distant future the Standard Model of physics will be the core of a vastly expanded model, which will include the phenomena that we cannot handle or explain today. This may pave the road to a warp drive, based on solid physics, and not flimsy fantasies.

The majority of evidence analyzing the Bob Lazar story points to the fact that he very skillfully constructed the story to keep himself out of jail, and he has no choice other than to continue telling this story to the end of his days.

My exit statement of this investigation is that I am not to be counted among the believers of the Bob Lazar story.

## Abbreviations

AC	Alternating Current
AI	Artificial Intelligence
AATIP	Advanced Aerospace Threat Identification Program
arcmin	arcminute: 1 arcmin = 1/60 degree
arcsec	arcsecond: 1 arcsec = 1/60 arcmin = 1/3600 degree
CalTech	California Institute of Technology
CERN	Conseil Européen pour la Recherche Nucléaire - European Organization for Nuclear Research
DC	Direct Current
DoD	US Department of Defense
F1	Flerovium, element 114
GR	Einstein's General Theory of Relativity
GWD	Gravity Warp Drive
hh:mm:ss	hours:minutes:seconds
IUPAC	International Union of Pure and Applied Chemistry
JINR	Joint Institute for Nuclear Research, Dubna (110 km north of Moscow, Russia) Russian: Объединённый институт ядерных исследований, ОИЯИ
LAMPF	Los Alamos Meson Physics Facility,
LANL	Los Alamos National Laboratory, Los Alamos, New Mexico, USA
LANSCE	Los Alamos Neutron Science Center (at LANL)
LHC	Large Hadron Collider
LLNL	Lawrence Livermore National Laboratory, Livermore, California, USA
Lv	Livermorium, element 116
Mc	Moscovium, element 115
MIT	Massachusetts Institute of Technology
mph	miles per hour
NFT	Non-Fungible Token (a one-of-a-kind asset that lives online and is managed by a digital ledger, [47])
NIST	National Institute of Standards and Technology
QCD	Quantum ChromoDynamics
RF	Radio Frequency
RTG	Radioisotope Thermoelectric Generator
UAP	Unidentified Aerial Phenomenon
UAPTP	Unidentified Aerial Phenomenon Task Force
UFO	Unidentified Flying Object

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## Appendix A – Highlights of the Movie “Bob Lazar: Area 51 & Flying Saucers”

“Bob Lazar: Area 51 & Flying Saucers”, [4], is a 2018 documentary movie by filmmaker Jeremy Corbell focused on the claims of Bob Lazar that he reverse engineered alien spacecraft for the US military at a secret facility named Site-4 (near Area 51) in Nevada, USA.

The full-length movie is available at major online movie streaming services.

The movie tells the story about Bob Lazar and his work at the Site-4 (S-4) facility near Papoose Lake in southern Nevada. Bob Lazar purports that he worked there in 1988-89 reverse engineering alien spacecraft held in custody by the US Air Force.

The movie is very seductive in conveying the Bob Lazar story in two ways:

1. Flickering images showing anything that has a remote relation with space and flying saucers (rockets, satellites, spacecraft, advanced aircraft, aliens, nuclear bomb tests ...) and a deep male voice narrative telling the “truth” about aliens and flying saucers.
2. Scenes with Bob Lazar in his home with his wife, telling his story, and scenes where he is working in his scientific shop: United Nuclear Scientific Equipment & Supplies.

The latter leaves an impression of Bob Lazar as an ordinary middleclass American living an ordinary middleclass life, making a living from his United Nuclear business. This is most likely the objective of Jeremy Corbell - demystifying Bob Lazar and creating an image of him as an ordinary, trustworthy person, hating being in the limelight, while at the same time creating an aura around the alien stuff.

The movie includes flashbacks to his TV appearances in 1989, in the interviews with George Knapp, KLAS-TV, Las Vegas, [6].

### Highlights from the movie

The time stamps are given in the format hh:mm:ss (hours:minutes:seconds).

The first nearly 7 minutes are very seductive and pivots around the FBI raid of Bob Lazar's store.

- 00:07:15 Narrative about Area 51 and hidden alien flying discs. Interview with Bob Lazar (alias “Dennis”, and seen only in silhouette) by George Knapp in May 1989.
- 00:07:35 The first appearance of Bob Lazar on KLAS-TV took place May 15, 1989.
- 00:08:34 When asked where and how US Military got hold of the saucers, Bob Lazar states that he hasn't the slightest idea.
- 00:10:30 A map is displayed with S-4 located in the Nevada (Nuclear) Test Range.
- 00:10:35 An aerial photo of Papoose Lake seen from north is displayed with a square positioned at the eastern shore of the lake ≈40% down from the northern tip.
- 00:10:47 George Knapp narrative.
- 00:12:00 Bob Lazar in polygraph test. George Knapp narrative continues until 00:13:22.
- 00:13:35 George Knapp states that Bob Lazar does not like the attention he gets: “It totally screwed up his life. Even years later he is still uncomfortable discussing these things”.

- 00:16:00 Bob Lazar: "In the late 1980'ies the US Government had recovered alien spacecraft, several of them, and their technology in the Nevada desert and keeping quiet about this". "That's the fact".
- 00:17:00 Bob Lazar explains the process of being employed at S-4. He states that he had sent resumés to several national labs. "I got a response from a couple of them. I went for an interview ...". But he says nothing about the Edward Teller involvement, which plays a critical part in other narratives.
- 00:17:45 Bob Lazar had to read 121 briefings while his security clearance was updated.
- 00:18:30 Bob Lazar: "I was given a demonstration of how the antigravity reactor worked and the physics of it".
- 00:20:00 George Knapp talking to Jeremy Corbell: We had the first interview with Bob Lazar in May of 1989. We verified his background and broke his identity in November 1989.
- 00:20:40 George Knapp: "It was the highest rated news special that ever aired in Las Vegas. And then it really exploded ...".
- 00:22:38 Jeremy Corbell interviews Mario Santa Cruz, a friend of Bob Lazar.
- 00:26:30 A text "MICHIGAN" appears and next follows an interview with Joy, Bob Lazar's wife in their home. (It is presumed that the text "MICHIGAN" denotes that they live in the state of Michigan. This is strange as the address of Bob Lazar's company United Nuclear Scientific has an official address in Klamath Falls, Oregon and that Bob Lazar a bit later in the movie drives to his shop).
- 00:28:15 Bob Lazar drives to his shop.
- 00:30:20 Bob Lazar: "All I have ever done is science-related stuff in my entire life".
- 00:31:45 Bob Lazar tells about the first time he saw the antigravity reactor in operation.
- 00:34:20 George Knapp talks to Jeremy Corbell: "...showed him (Bob Lazar) alien bodies ... broken down so that you could see their organs ..."
- 00:34:50 Jeremy Corbell asks Bob Lazar about the hand scanner and shows him a photo of it.
- 00:35:55 Bob Lazar laughs: "I never thought that I would see one of those again".
- 00:37:40 Film with demo of Bob Lazar's jet-engine powered bicycle.
- 00:38:40 Narrator talks about Bob Lazar's work at LANL with a particle accelerator. He states that the "half mile long behemoth" is capable of generating 700 million volts!  
(This is a misconception. The linear accelerator is capable of accelerating protons to an energy of 700 million electron Volts (MeV) – or even 800 MeV, according to Wikipedia, [D-8]).
- 00:38:54 An LANL phone book from 1982 is displayed. First the front page and next a page with an entry: Lazar Robert among others with an initial L. (Note that the company name EG&G is listed on the front page!! EG&G is the company through which Bob Lazar was hired to S-4).
- 00:39:05 The article in Los Alamos Monitor about Bob Lazar's jet-engine powered car.
- 00:39:20 A picture is shown of the EG&G company building where Bob Lazar was interviewed for the job at S-4.
- 00:40:46 The sports Model flying disc is shown hovering over a road with a bluish glow at the bottom.
- 00:44:15 George Knapp talks about Bob Lazar's involvement with a brothel.
- 00:46:04 Bob Lazar shows a 3D scale model of the Sports Model flying disc
- 00:47:00 Bob Lazar talks about S-4, where he is looking into a hangar through a window in a door, and sees two guys looking down and talking to something small, with long arms. (a child-size alien ?)
- 00:47:35 Jeremy Corbell: "Did you see and alien ?" Bob Lazar: "I don't think I saw an alien. No it was probably a doll".



- 00:50:50 Bob Lazar talks about the conventional action-reaction propulsion used in our jet engines and rocket engines vs. the “field propulsion”, reaction-less propulsion scheme of the disc. “It creates a distortion of space and time in front of it.
- 00:51:50 Jeremy Corbell: “What did you learn from your story ?”  
Bob Lazar: The big thing is suppression of extremely advanced technology ... [pause] ... and the suppression of unknown science.
- 00:54:24 Bob Lazar: “It just led me to believe that the size of the cadavers I saw. ... the size of the seats”. (In other narratives Bob Lazar denies having seen an alien. See e.g. 00:47:35).
- 00:54:42 A picture showing the Sports Model flying disc over Papoose Lake seen from then north is displayed.
- 00:58:00 Bob Lazar in hypnosis.
- 01:00:00 Bob Lazar sketches the sports model flying disc + the antigravity reactor.
- 01:01:30 In the November 1989 KLAS-TV interview, Bob Lazar describes what he saw when he got off the bus with blackened windows after having been taken to S-4.  
“It was a very interesting building. It’s got a slope of about 30°, which are hangar doors, which had textured paint on it, which looks like sand, which looks like the side of the mountain”
- 01:01:50 Bob Lazar describes the propulsion system of the flying disc. “It uses gravity as a wave in a waveguide, almost like microwaves”.
- 01:02:15 Bob Lazar in polygraph test.
- 01:03:45 Bob Lazar mentions Mike Thigpen.
- 01:04:25 George Knapp talks about the flights test of the Sports model flying disc over Papoose Lake.
- 01:04:30 Footage from the Bob Lazar videos recorded during the flight test parties is displayed. First on March 22, 1898, at 08:57 pm and next on March 29, 1989, at 08:29 pm. The video shows a small, glowing orb in the sky. The video seems to be recorded with a telephoto lens due to the unsteady pointing of the camera. Then follows footage from driving in the desert on April 05, 1898 at 07:05 pm.
- 01:04:55 George Knapp mentions that Bob Lazar knew element 115 and Bob Lazar had been consulted by the lab that first synthesized element 115.
- 01:05:45 Jeremy Corbell interrogates Bob Lazar about his job function at S-4.
- 01:06:10 Bob Lazar states that he termed the flying disc the “Sports Model” (due to its sleek appearance). Next, he sketches the Sports Model flying disc and describes the propulsion system.
- 01:07:50 The sketches of the disc are presented.
- 01:09:50 Bob Lazar states that the disc flies belly first.
- 01:10:25 Bob Lazar presents the complete sketch.
- 01:11:10 Newspaper article “UFO guy in spotlight” is displayed.
- 01:11:40 Newspaper article “Lab supplier in controversy” (about the FBI raid) is displayed.
- 01:12:55 The Sports Model flying disc hovering in front of the hangar doors at S-4 is displayed.
- 01:14:10 Jeremy Corbell asks Bob Lazar if he ever did get an element 115 sample out of S-4. Then follows video garbage of Bob Lazar’s response (“encrypted” speech). Next day, the Bob Lazar shop was raided by FBI. Then follows Bob Lazar talking about the raid, which followed the next day.
- 01:18:57 A young male staff member at United Nuclear talks about the way he experienced the FBI raid. At this place in the movie, he is not identified. However, in the credits (Danish: rulletekster) at the end of the movie, the name Zack Slizewski appears in the list. He

- person that responded to my inquiry for the Sports Model flying disc poster with Bob Lazar's personal signature on 2022-12-28.  
See also the cast at <https://www.imdb.com/title/tt9107368/>
- 01:21:40 A text "NEVADA" appears, and next George Knapp talks about Element 115 as a key to the Bob Lazar story. If a sample could be found and have it independently analyzed, this would prove beyond doubt that that it came from somewhere else.
- 01:22:45 Jeremy Corbell talks about a VHS video tape with a "cloud chamber test" (probably of element 115). The "cloud chamber" video is displayed (first part  $\approx$ 22 sec. duration). (It shows something that looks like an oval metal (?) plate in the bottom, having a hole in the left-hand side and something that resembles a plastic cable strip through it. In the upper left part of the plate lies a green unidentifiable item. The scene can be positively confirmed to be a cloud chamber due to the thin streaks of vapor that are created a few times by high-energy charged particles passing through, and the streaks slowly sinks towards the bottom while dispersing. This is typical of cloud chambers.  
Jeremy Corbell, while talking by phone to George Knapp, concludes that "...there is only a minute of it. However, after all these years, thirty years, we have some footage of it, but it doesn't prove shit".  
There is nothing in the cloud chamber video, that indicates that this should be a test of an element 115 sample. And why all this fuzz about the cloud chamber and element 115, when it is stated by bob Lazar that it is non-radioactive, [5] at 00:27:45.)
- 01:23:25 The cloud chamber video continues, now with lots of fog or mist coming in from a source in the upper left corner, but no charged particle streaks are seen (second part  $\approx$ 14 sec. duration).
- 01:23:25 George Knapp: "I was there the night, the day they did the cloud chamber test. I couldn't tell what it was. I didn't know what a cloud chamber was. This beam of light was bent, and it was bent because they had a lump of 115 in this part of the experiment. Well, that's pretty important. It would be huge to include it into the story".  
The settings of this experiment are not revealed in the George Knapp narrative, but it must have taken place outside S-4, and this would imply, that a sample of element 115 was sneaked out of S-4 by Bob Lazar, which he denies. The bending of light would be a sensation if true, but again no details are given.
- 01:23:40 Jeremy Corbell states that he talked to eight or nine scientists (including Lawrence Livermore National Laboratory - LLNL ?) in San Fransisco and Russia (Joint Institute of Nuclear Research - JINR), who said that they can't rule out that a stable isotope of 115 exists.
- 01:24:05 Jeremy Corbell says that he talked to experts about element 115 and its stability. (But he does not give any statement on whether it is supposed to be stable or unstable).
- 01:25:25 Bob Lazar talks about element 115 and states that "Element 115 affects gravity. Element 115 produces its own gravitational energy". He continues to and sketch how it is machined into a wedge, starting with a pile of disks which are fused together (with no explanation of the process), then, using a lathe, turned into a cone, and finally cut to wedge shape. Following that, Bob Lazar explains the operation of the antigravity drive, which directs the gravity wave through the waveguide and archways (only mentioned here) into the gravity emitters and allows it to propel the craft and manipulate the gravity waves the ways they want.
- 01:29:24 An aerial view of the United Nuclear building is displayed
- 01:32:50 George Knapp states that the purpose of the FBI raid was to look for samples of element 115 (and he states that it happened in Michigan !!!)
- 01:33:34 An aerial view of the United Nuclear building is displayed
- 01:37:00 End of movie.

## Appendix B – Highlights of the Joe Rogan Experience #1315

The podcast “Joe Rogan Experience #1315 - Bob Lazar & Jeremy Corbell”, [5], dated 2019-06-21, is a very comprehensive interview with Bob Lazar telling his story and backed by filmmaker Jeremy Corbell.

In the beginning of the interview Bob Lazar states that he suffers a migraine attack hampering him responding to the questions by Joe Rogan. Not very far into the interview the migraine seems to cease and Bob Lazar appears very fit for telling his story during the rest of the podcast.

Joe Rogan questions Bob Lazar very meticulously, to get as much detail out of him as possible, but he never scrutinizes the story and how Bob Lazar justifies or proves his far-reaching claims and how they hold up against current physics.

### Highlights from the video

When the wording indicates that a verbatim statement is made, it comes from Bob Lazar unless otherwise noted.

The time stamps are given in the format hh:mm:ss (hours:minutes:seconds).

- 00:01:07 Site-4 (S-4) is 15 miles south of Area 51.
- 00:01:15 Bob Lazar: You can call it a subset of Area 51
- 00:01:35 Los Alamos National Laboratory: Bob Lazar is involved with nuclear weapons development and physics. “They do everything there”.
- 00:01:55 In 1982, Bob Lazar installs a jet engine in his Honda car, which can reach 200 mph.
- 00:02:22 The day the article about Bob Lazar’s jet engine Honda came out on the front page of the Los Alamos monitor newspaper was the day Edward Teller, [https://en.wikipedia.org/wiki/Edward\\_Teller](https://en.wikipedia.org/wiki/Edward_Teller), was giving a lecture at LANL.
- 00:02:44 When Bob Lazar reached the lecture building, Edward Teller was outside and reading the article about Bob Lazar’s car. Bob Lazar introduced himself and they talked for a while.
- 00:03:15 Bob Lazar tells that in 1988 he wanted to go back into the science community again and sent out resumés including one to Edward Teller with a reference to the meeting years earlier. Edward Teller urged him to contact the company EG&G Special Projects at McCarran International Airport in Las Vegas about special job opportunity in advanced propulsion in a remote location.
- 00:05:28 Joe Rogan: “Take me back to the first day on the Job”. Bob Lazar starts telling this story.
- 00:06:16 Joe Rogan: “When did things get weird?”
- 00:06:55 S-4 is in the side of a mountain. Normally when the staff members got off the bus they went into the facility through a normal double door.
- 00:07:04 “This time when I went in, there were hangar doors open. I went in though the hangar door, and in the hangar door was the disc, the flying saucer that I worked on. I saw it sitting there and I walked by it. It had a little American flag stuck on the side, and I thought Oh My God, this finally explains all the flying saucer stories. This is just an advanced fighter. This is f\*\*\*ing hilarious. So, I went by and slid my hand along the side of it, and I got reprimanded immediately for touching the thing, and there was a guy, an

- armed guard that followed us in who said: *keep your eyes forward and your hands at your side and just walk in the door*".
- 00:07:50 Bob Lazar: "We had some of the subcomponents [of the propulsion system] of the craft in the lab". Met partner named Barry for the first time.
- 00:08:10 Bob Lazar gets a demo of the antigravity reactor working.
- 00:08:45 Bob Lazar describes the antigravity reactor design
- 00:09:20 Bob Lazar describes that the reactor, when activated, pushes his hand away when trying to touch it, and he cannot touch the hemisphere when the reactor is running due to the strong antigravity field around it.
- 00:10:10 Bob Lazar states that he was hired to back-engineer the alien craft.
- 00:10:30 Bob Lazar talks about the rigid compartmentalization of the work with the alien craft and that his task was to work on the propulsion system.
- 00:12:30 Joe Rogan: "How do they turn on the reactor?"  
Bob Lazar: "The reactor can be turned on and off in a lot of different ways". One of the ways is to install or remove the hemisphere. (But due to the repulsion described above at 00:09:20, it should be impossible to remove the hemisphere after having installed it).
- 00:13:10 Bob Lazar states that there is no wiring in the reactor and that the reactor is load-sensing: "Borderline magic".
- 00:13:45 Bob Lazar mentions that there were "horrific" accidents before he joined S-4.
- 00:14:05 The engineers at S-4 tried to cut into a working reactor which caused fatalities.
- 00:14:30 They were using a plasma cutter to cut into the reactor.
- 00:14:40 S-4 has nine alien craft. Bob Lazar only worked with one of them but saw the others.
- 00:15:00 Bob Lazar: "All alien craft has different shapes".
- 00:17:15 Bob Lazar: "The amount of power we are dealing with is astronomical".
- 00:20:10 The alien craft are from the Zeta Reticuli star system.
- 00:20:25 Bob Lazar states that he has no idea how they got hold of these spacecraft.
- 00:20:30 The aliens come from the third planet in that star system (this information comes from printed material). Bob Lazar: "Is that true ? I have no way of verifying that".
- 00:23:00 The reactor produces antigravity.
- 00:23:50 There is a fuel source in the reactor.
- 00:24:50 Bob Lazar was employed six months at S-4.
- 00:25:00 "We came up with a bunch of ideas how the reactor works".
- 00:25:05 "The square base is a cyclotron".
- 00:25:30 "Element 115 is the fuel".
- 00:25:45 Joe Rogan: "When was element 115 first produced?"  
Bob Lazar: "I don't remember", addressing Jeremy Corbell: "Do you remember when...".  
Jeremy Corbell: "2004, Darmstadt Germany ...".  
(This is wrong. It was discovered/synthesized at the Joint Institute for Nuclear Research in Dubna, Russia in 2003, by a joint team of Russian and American scientists, [85]).
- 00:26:15 The work was carried out in 1988-89.
- 00:27:30 Joe Rogan: "Over time, many things you talked about in the 80'ies have proven true, e.g. element 115".
- 00:27:45 Element 115 is stable, no radioactivity.
- 00:29:35 Bob Lazar states that he looked inside the craft on only one occasion.
- 00:30:10 Bob Lazar describes the interior of the craft.
- 00:31:00 The aliens are much smaller than us, about 1 meter tall (inferred from the child size seats). You can't stand up inside.

- 00:31:45 Bob Lazar describes the archways of the craft, one of which can become transparent.
- 00:32:40 The material of the craft is cold to the touch.
- 00:33:00 Bob Lazar describes the compartmentalization of work performed at S-4.
- 00:34:00 There are three seats equidistantly arranged in the craft. There are no flight controls.
- 00:34:35 There are three levels in the craft. Directly under the main deck are three gravity amplifiers.
- 00:34:45 Underneath are the emitters.
- 00:35:50 The craft is 52 feet ( $\approx 16$  m) in diameter.
- 00:36:00 Bob Lazar describes the other alien craft. "They were completely different, One was like a classic jell'o mold", <https://www.nytimes.com/2019/11/25/dining/jello-mold.html>. Bob Lazar describes another of the craft as a straw hat and that there was what looked like a bullet hole in the thin part of the disc.
- 00:36:45 Joe Rogan: "And that one was roughly the same size ?"  
Bob Lazar: "They were kind of too far away to tell". (This seems strange: How could he then see the bullet hole ???)
- 00:39:50 Bob Lazar describes the tests made on the reactor. The reactor defies the first law of thermodynamics and other laws of physics.
- 00:41:55 Bob Lazar describes the flight tests of the craft.
- 00:42:20 Bob Lazar talks about how he witnessed the Sports Model disc preparing to lift off. They were in communication with somebody in the craft.
- 00:42:50 Bob Lazar: "It quietly lifted off".
- 00:43:00 The craft produces a little corona discharge at the bottom while lifting off. There was a slight hiss sound when it had cleared the ground. At 5 – 10 feet the hissing stopped and the blue glow disappeared.
- 00:43:55 Bob Lazar: "They communicated with it ... with a regular VHF radio to the person in the craft. I saw the frequency on the frequency counter".
- 00:44:05 Bob Lazar: "He shouldn't be able to communicate with the craft with a radio. The Radio waves should bend around the craft".
- 00:44:35 The reactor is in the center, and there is a [gravitational] "waveguide" that goes up to the top, and it produces a "heart-shaped" gravitational distortion. If you walk under the craft while hovering, you cannot see the craft. The light bends around it.
- 00:44:45 Bob Lazar: "When it is sitting in the air and you walk underneath it and you look up, you cannot see the craft. The light bends around it. You bend gravity. You bend light. It bends radio waves".
- 00:45:45 Bob Lazar talks about the test flight schedule of the alien craft, and that he had access to the schedule.
- 00:45:50 Bob Lazar talks about the "High performance tests": They go above the mountain range. They do some radical moves with it.
- 00:46:40 Joe Rogan: This was before the government had expanded the forbidden territory around Area 51, Papoose Lake.
- 00:49:45 Bob Lazar: "I took my closest friends and kind of got together ... Remember that job I told you about. This is what's going on and ... on Wednesday night we all need to go out. I want to show you what's going on. So we went outside the base out into the desert so everybody could see the high performance test".
- 00:50:20 George Knapp has Bob Lazar's videos of the test flights.
- 00:51:30 Jeremy Corbell: Bob Lazar's video is on YouTube. (Not found. FH 2021-04-23)
- 00:53:20 Inertia is not going to affect it.
- 00:53:50 Bob Lazar: "On the third time we got caught".

- 00:54:15 Bob Lazar mentions Gene huff participating on the third night.
- 00:54:40 Bob Lazar: "About 20 feet in front of us we see a little green light fall on the ground and roll to us and unbeknownst to us ... now it's pitch black. You can't see your hand in front of your face. There are a bunch of guards standing right out there, and they had a night vision scope, like there were from here to the wall (in the JR studio) looking at us listening to us, and the guy dropped it, and the scope rolled over to us, and we could see the green screen, and all these guys were there".
- 00:55:10 Bob Lazar tells that he went into a debriefing after being caught.
- 00:56:35 Bob Lazar subsequently contacted George Knapp.
- 00:57:30 Bob Lazar talks about what happened after being caught, but refuses to go into details in order not to get into more trouble than he already is. "We had to go back to Los Alamos and ... I really don't want to talk about that".
- 00:57:36 Joe Rogan: "The top-secret weapons stuff that you were working on?"  
(Particle Beam Weapons?, cf. Appendix E)
- 00:57:41 Bob Lazar: "No I am talking about the 115 ..."
- 00:59:10 Bob Lazar talks about "UFO crackpots".
- 01:00:45 Jeremy Corbell mentions ATIP (Advanced Threat Identification Program, by US DoD)
- 01:01:50 Jeremy Corbell: Hillary Clinton publicly introduced the designation UAP (Unidentified Aerial Phenomenon)
- 01:04:10 Jeremy Corbell: "Bob, they announced gravity as a wave. you were right. You are vindicated". (The discussion refers to the first gravitational waves detected by the LIGO observatories on September 14<sup>th</sup>, 2015, <https://www.ligo.org/detections/GW150914.php>).
- 01:04:35 Following this discussion Bob Lazar talks about the gravitational wave detector (LIGO), but he knows only very little about this breakthrough facility and the first discovery of gravitational waves.
- 01:05:50 Bob Lazar: "In the eighties the predominant theory was gravity is produced by gravitons, theoretical particles. They are not, they are waves, they are not particles".
- 01:06:20 "We can observe gravity, but we have no idea what it is".
- 01:06:50 "What we worked with out in the desert was a machine that MAKES gravity".
- 01:07:55 "I'm fascinated with the [alien] technology. It hurts me every night that it was my own doing that prevented me continuing in the project".
- 01:09:00 Jeremy Corbell: The [Admiral] Wilson memo leak. EG&G Special Projects.
- 01:14:00 One of the alien craft is old. From an archaeological dig.
- 01:15:15 The Wilson memo is shown on the screen. After this, ATIP is discussed.
- 01:17:40 The end of Bob Lazar's engagement with S-4.
- 01:18:55 George Knapp breaks Bob Lazar's story on 5'o'clock [KLAS TV] news.
- 01:19:25 The consequences of Bob Lazar's appearance on TV are discussed.
- 01:21:20 Joe Rogan: "These are the two big questions of humankind: What happens when we die? Are we alone in the universe?"
- 01:23:10 "With this technology you become invincible!"
- 01:23:40 There were Russian scientists at S-4 (in the late 1980'ies)
- 01:24:50 Bob Lazar states that a big discovery was made, and after that the Russians were never allowed on the base.
- 01:25:25 Joe Rogan: "Do any other government have something similar?"  
Bob Lazar: "No, not that I know of".
- 01:25:50 Bob Lazar: "They have nine of them" [alien craft]. Then talking about the craft retrieved by archeological dig.
- 01:26:20 Joe Rogan: "They go into the water" (transmedium vehicles).

- 01:26:30 Jeremy Corbell talks about the Pentagon videos and the videos are discussed.
- 01:29:30 The alien disc flies belly first! Look at the GIMBAL video (roll maneuver).
- 01:31:25 If they [the Zeta Reticulans] have heavier elements that we don't have (If element 115 is a naturally occurring material). Who says they follow normal [scientific] progression.
- 01:32:40 The nature of the Zeta Reticuli aliens is discussed: Are they biological or technological/AI creatures (sentient artificial life?)
- 01:36:10 Joe Rogan: "Marshall McLuhan says: *We are the sex organs of the machine world*".
- 01:39:55 Joe Rogan: "Biologists believe that monkeys and chimps and other great apes are moving into the stone age".
- 01:43:40 Joe Rogan: "Like we are observing the monkeys moving into the stone age, they are observing us, recognizing that there is a pattern".
- 01:44:50 Joe Rogan: "We are very childlike in our actions. We haven't had to learn these things that we have been able to have, and you have only been able to have them because other people innovated and spent ungodly amounts of time and effort and focus in the lab to create these things (like the Tesla car, the smartphone etc.) All we do is to make better things".
- 01:48:10 Joe Rogan: "They are what happens when things keep going".
- 01:50:40 Bob Lazar: There was talk of weapons systems applications of the craft (project Sidekick).
- 01:51:10 Bob Lazar: "Small intentional distortions of time and how that can be used as a ..."
- 01:52:10 "If there is a gravitational envelope in there (Inside the craft), which negates any inertia effect, or you are seeing through a gravity distortion field ... you can only see it through the field ... "
- 01:53:10 Discussion of David Fravor's sighting of a UAP (on radar).
- 01:53:50 Discussion of the reactor: Nothing is connected. No wiring.
- 01:57:10 There is a hatch made of honeycomb material to the deck below the main deck.
- 01:58:40 Joe Rogan: There has been some sort of effort to erase your past. A 1982 directory of phone numbers from LANL proves that Bob Lazar was employed.
- 01:59:30 Bob Lazar: "George Knapp was the first to uncover that" [the disappearance of Bob Lazar's birth certificate and university diploma].
- 02:00:20 Bob Lazar says that he was on the front page of the Los Alamos Monitor newspaper [with his jet engine car] presented as a physicist at LANL.
- 02:00:45 Joe Rogan talks about the hand scanner security device.  
Bob Lazar explains the function of the scanner and then: The badge pops out when the hand has been scanned and accepted, and then he could enter S-4.
- 02:01:02 Joe Rogan about the hand scanner: "This was back in the eighties where when you discussed this people would say: *This doesn't even exist*".
- 02:04:50 Joe Rogan: I don't like the term "sceptic". Then follows a discussion about why he doesn't like sceptics. "I want people to be objective".
- 02:14:44 End of podcast.

## Appendix C – Highlights of the Bob Lazar Interview with George Knapp

The title of this video is “Bob Lazar describes alien technology housed at secret S-4 base in Nevada – Part 5”, interview by George Knapp, KLAS-TV, Las Vegas, [6].

This video, even if dated 2019-11-08 on YouTube, is assumed to be aired in late 1989 after Bob Lazar went public in May 1989 as “Dennis” with his story about alien spacecraft held in custody at a secret US military facility named Site-4 (S-4) near Papoose Lake, Nevada, USA.

Even if this video is denoted “Part 5”, it has not been possible to identify Parts 1 to 4, or possible higher numbered parts.

### Highlights from the video

The time stamps are given in the format hh:mm:ss (hours:minutes:seconds).

- 00:01:09 A map of Area 51 including Nevada (Nuclear) Test Site is shown and the narrator talks about Area 51 accompanied by photos and movies of some of the technologies developed and tested here (U-2 and SR-71 spy planes, F-117A stealth fighter and “Star Wars” technology) and telephotos of the facilities at Groom Lake.
- 00:01:40 The narrator mentions that Area 51 has many nicknames: “Dreamland”, “The Ranch” and “The Skunk Works”.
- 00:03:10 The narrator talks about the rumors that alien technology is tested in the Nevada desert and about project “Aquarius” and other stories about flying saucers in the area.
- 00:04:45 “Dennis”, shown in silhouette against the sky, apparently in a bus, talks about the flying discs of extraterrestrial origin at S-4. This takes place in May 1989 according to a text displayed on the screen.
- 00:05:15 The real name of “Dennis” is revealed to be Robert (Bob) Lazar.
- 00:05:35 George Knapp states that Bob Lazar tells his story in order to protect himself.
- 00:05:40 A topological map of the area around Papoose Lake is shown.  
(Here the area to the west of the northern tip of Papoose Lake is denoted S-4, but this seems to be in the Nevada (Nuclear) Test Site area. S-4 is stated by the narrator to be a few miles south of Groom Lake, but it is more like about 24 km (15 miles) southwest of Groom Lake).
- 00:06:00 George Knapp states that checking Bob Lazar’s credentials proved to be a difficult task.
- 00:06:30 A 1982 phone book from LANL is shown where the name Robert Lazar is listed.  
(Note that the company name EG&G is listed on the front page!! EG&G is the company through which Bob Lazar was hired to S-4).
- 00:06:38 The article in Los Alamos Monitor about Bob Lazar’s jet-engine powered car is shown.
- 00:06:55 The EG&G building is shown.
- 00:07:20 Bob Lazar states that he was employed by the US Navy.
- 00:07:25 The narrator states that Bob Lazar and other employees would gather at EG&G, fly to Groom Lake and transported in a bus with blinded windows to S-4.
- 00:07:35 Bob Lazar describes the buildings at S-4.
- 00:08:00 Bob Lazar states that he was required to read a series of briefings on his first day at S-4.



- 00:08:05 Bob Lazar tells about the antimatter reactor, the gravity amplifiers and that there is no physical hookup between these devices, and that “they run gravity amplifiers ... they use gravity as a wave using waveguides, almost like microwaves”.
- 00:08:30 Bob Lazar talks about a poster with drawings of the flying disc put up “all over the place”. (This seems to be the only occasion where Bob Lazar talks about this).
- 00:08:58 Bob Lazar talks about the first time he saw the sports model flying disc. He was walked past the disc instead of guiding him directly to the office area. Bob Lazar touched the disc while passing and was led to the office area.  
(In the Joe Rogan Experience episode #1315, Appendix B of this report, Bob Lazar says that he was reprimanded immediately when touching the disc and was intimidated by the armed guards, but not in this interview).
- 00:09:25 Bob Lazar states that after that he got to see the disc flying.
- 00:09:25 Bob Lazar: “... the hangars are all connected together with large bay doors between each one. There were nine [discs] total that I saw, each one being different”.
- 00:09:50 Bob Lazar and the narrator talks about security measures at S-4 and the oppressive atmosphere of intimidation and use of fear as an instrument to control the staff. The intimidation by the guards wearing M-16 rifles is also mentioned.
- 00:10:20 Bob Lazar in polygraph test.
- 00:10:40 The narrator states that the results of the test were inconclusive, and that Bob Lazar should run a new test with another examiner.
- 00:10:50 The conclusion on the second series of tests is that Bob Lazar made no attempt to deceive. However, one of the other examiners analyzing the same test results concluded that Bob Lazar might convey information that he learned from someone else. A final statement on truthfulness could not be made until more testing had been conducted.
- 00:11:55 Bob Lazar asserts that he is telling the truth.
- 00:13:35 George Knapp states that Bob Lazar will accept no more interviews or give any lectures.
- 00:12:45 George Knapp states that Bob Lazar accepted this interview because certain unfavorable things began happening in his life.
- 00:12:55 George Knapp states that they will broadcast much more about this story and what is happening at S-4 on the following Monday and beyond. This will include people who have witnessed the disc test flights and who have worked with Bob Lazar.  
(These broadcasts have not been found).
- 00:13:00 George Knapp rounds up the broadcast talking about the contacts that he has made with people who know Bob Lazar, US Navy and other authorities.
- 00:14:12 End of video.

## Appendix D – Highlights of the “Flyvende tallerken” Podcast Episode 13

This podcast is an interview with filmmaker Jeremy Corbell. It is episode #13 of the Danish podcast series “Flyvende tallerken” (Flying saucer), by Danmarks Radio (Danish Broadcasting Corporation), and is entitled: “Historien om Bob Lazar” (The Bob Lazar story), [14]. Most of this podcast is in English, but there are intermezzos during which the podcast hosts discuss the interview in Danish. This reference is a key to understanding the story of the “Hand scanner” used at S-4 for authenticating the staff before being allowed into the facility.

Most of the highlights presented here are verbatim transcripts of the segments of the interview relevant to understanding the case of the Hand Scanner.

If no person is indicated as the speaker, it is implicitly Jeremy Corbell.

### Highlights from the podcast

The time stamps are given in the format hh:mm:ss (hours:minutes:seconds).

- 00:15:00 I spoke with colleagues of his (i.e. Bob Lazar), who worked with him at Los Alamos. They acknowledged that he was a physicist at Los Alamos, that he was hired in that capacity, and that they worked with him. One of those people went on record ... [JC voice fades].
- 00:18:08 This is a man (i.e. Bob Lazar) who owned a brothel at one time [laughing]. I mean ... I don't know if there is a ... like a big ... I think that by punishing Bob Lazar would be the best way to acknowledge that he is telling the truth.
- 00:19:00 What's the problem? Here is the problem. I know the problem. I'll tell you exactly what it is. The first problem is that we can't replicate the technology. We do have bits of the technology. We cannot replicate it. Our material science is not sophisticated enough. We cannot align atoms in meta-materials in a way to fabricate, replicate and duplicate their physical properties found within these meta-materials. We cannot do it. So, the problem becomes weaponization. Whoever is able to duplicate these technologies first, they win. That's it. Game over!
- 00:24:30 I mean, I'll be brief, but just to give you a point on how Hollywood has influenced things, so one of the things in my movie is, Bob Lazar has always for thirty years talked about the scanner, that he had used to get into this facility at Site-4 at Area 51.
- 00:24:44 Bob Lazar (recorded narrative): It's a small plate with some pins on it to put between your fingers. There's a bright light above it. The interesting thing is that when you walk into the facility, or even to leave, they have a hand reader. I was told that it has to do something that measures the ... the bright light measures the bones in your fingers and there you need ... [bell-like noise] ... it sounds like something out of a TV show, but it is actually the way it is.
- 00:25:09 We talked about it and he talked about it for thirty years. I showed him photographs because it was finally acknowledged. Hey, these scanners were used at the secure facilities at the Area 51 complex exactly at the time Bob Lazar said. Now, this was all classified until in the middle of cutting my movie, so I got these images and showed them to him while I was filming, and he said: “Oh my gosh. I can't believe this, and I never thought that I would see them again”.

- 00:25:40 So, for me that was a big moment. And people found out after they started ... they watched my movie. They saw this and there's like a split second in the movie "Close encounters of the third kind" by Steven Spielberg, where there's a flash, only from the side. You can't tell what it is or what it does. Bob Lazar describes that it measures the bones in your hand and all this stuff. Right! He explained how it works, but before that nobody had ever brought it to people's attention. In that movie, very quickly, there's a flash of this hand scanner from the side, and only the side of it, that he uses to get into a room.
- 00:26:19 That is an example of how Steven Spielberg didn't even know. From what I understand, by the way. So, when I worked with him recently, he told me that he didn't know. They brought in props to make it more authentic, as if they're going into a secret laboratory. So this is just one of those props. So yes, the military has always worked with Hollywood to slowly introduce authenticity about these types of programs. Now people used that against Bob Lazar and said: "That scanner was in the movie. That's where he got the idea". However, they're missing the point.
- 00:26:56 The point is: It doesn't matter if the scanner existed, or if Bob ever did see it, which he didn't, and nobody did ever bring that up before in thirty years. But it is a fact that he knew that it was used at that base at that exact time, and that it was classified information until I was able to reveal it to him. So that's an example by the way on how popular culture and ... yeah ...
- Here follows a question from the podcast hosts about the speed at which Bob Lazar was introduced to the alien craft and why there wouldn't be a lengthy security clearance process before being allowed into Site-4.
- 00:33:23 What people don't know is Bob Lazar already had a Q clearance, which was an important Department of Energy clearance that he had at Los Alamos because he worked on the particle accelerator. He already had been through a lot of the vetting process that is necessary when you're looking to get a security clearance to work within the United States military. So, the speed with which they threw him into this ... this new program. First of all, they didn't just throw him into it. He went in there numerous times and was slowly allowed to see more and more. I think that he only saw the craft on his third visit to Area 51.
- 00:38:48 A segment of the Joe Rogan Experience #1315 with Bob Lazar is replayed, where he talks about the first time he saw the flying disc at S-4.
- 00:40:35 End of replay.

## Appendix E – “The Lazar Tape and Excerpts from the Government Bible”

I only became aware of this video, ref. [138], very late in my investigation, and therefore it appears as the last appendix.

This video is a schoolmaster style lecture about the antigravity drive of the Sports Model flying disc and the “physics” behind it, produced by Bob Lazar and Gene Huff, whom we learned about in section 2.7. According to ref. [139] this video is produced in 1991 a couple of years after Bob Lazar was sacked from S-4. This, if correct, proves that Bob Lazar’s talk about Gravity A and Gravity B originated before he met Kenneth F. Wright, who’s flawed “Nuclear Gravitation Field Theory” is in line with Bob Lazars ideas, cf. Appendix G, second part.

Comparing the pictures of Bob Lazar in the KLAS-TV interview by George Knapp, [6], and this video, both shows a young Bob Lazar: Same haircut, same glasses, although Bob Lazar in the present video looks even younger than in the KLAS-TV interview.

### Highlights from the video

The time stamps are given in the format hh:mm:ss (hours:minutes:seconds).

- 00:07:00 Bob Lazar tells that starlight bends around the Sun, but he does not tell how much (bending angle) He seems to pretend that the star is deeply hidden behind the Sun.
- 00:08:30 Bob Lazar explains that spacetime distortion can bring distant points A and B together by an intense gravitational field.
- 00:09:45 Bob Lazar explains how to generate a gravitational field. Gravity as a wave and the “currently accepted theory of gravitons” = total nonsense.
- 00:10:05 Bob Lazar states that gravity is a wave and that there are Gravity A and Gravity B. Gravity A = micro-scale, Gravity B = macro-scale, the “big gravity wave”.
- 00:10:35 Bob Lazar: “We are not familiar with Gravity A. It’s the small gravity wave, which is the major conservatory force and holds together the mass and makes the ... protons and neutrons. Gravity A is currently being labelled as the strong nuclear force in mainstream physics, and Gravity A is the wave that you need to access and amplify to enable you to cause spacetime distortion for interstellar travel”.
- 00:12:40 Bob Lazar: “The majority of solar systems in our Milky Way galaxy are binary and multiple star systems. In fact, many single star systems have stars that are so large that our sun would appear to be a dwarf by comparison. Keeping this in mind it should be obvious that a large single star system, a binary star system or multiple star system would have had more of the prerequisite mass and electromagnetic energy present during their creation. This makes it possible for these systems to possess elements, which are not native to the Earth. Scientists have long theorized that there are potential combinations of protons and neutrons, which should provide stable elements of atomic numbers higher than any of which appear in our periodic chart, so none of these heavy elements appear naturally on Earth”. (This is a very strange allegation).
- 00:13:25 Bob Lazar continues to talk about heavy elements and about the super-heavy elements synthesized in laboratories. He continues to talk about the experiments with synthesis of super-heavy elements in Germany. (Bob Lazar is probably thinking of Gesellschaft für Schwerionenforschung – GSI, but does not name this institution, which is renowned for their research on synthesis of super-heavy elements).

- 00:14:10 Bob Lazar states that the attribute of super-heavy elements is that the Gravity A wave is so abundant that it actually extends past the perimeter of the atom. These elements actually have their own Gravity A field around them.
- 00:14:45 Bob Lazar states that that amplitude, wavelength and frequency of the Gravity A wave is just like any wave in the electromagnetic spectrum.
- 00:15:40 Bob Lazar states that the Gravity A wave is so powerful that the only naturally occurring source of gravity that cause spacetime to distort this much would be a black hole.
- 00:19:10 Bob Lazar states that Element 115 is used in the antimatter reactor (of the Sports Model flying disc)
- 00:19:30 Bob Lazar states that Element 116 releases antimatter.  
In the sequel, Bob Lazar talks antimatter and nuclear bombs.
- 00:22:12 Bob Lazar shows a sketch of the antigravity reactor and explains its operation including the release of antimatter into vacuum in a “tuned tube” (the “tower” in the middle of the reactor) and propagates down to a target gas at the bottom, where it annihilates with normal matter in the gas and releases heat, which is converted to electricity in a thermoelectric generator.
- 00:23:35 Bob Lazar states that only 223 grams of Element 115 is required for 20-30 years of operation. The melting point of Element 115 is 1740°C.
- 00:24:45 Bob Lazar states that he nicknamed the flying disc, on which he worked, the “Sports Model due to its sleek design.
- 00:24:40 Bob Lazar displays a sketch of the Sports model flying disc (not as sleek in this sketch as in later sketches), and states the dimensions of the disc to be 16 feet (4.88 m) tall and 40 feet (12.19 m) in diameter (these dimensions are smaller than later estimates).
- 00:25:55 Bob Lazar talks about “control consoles”. In later statements there are explicitly no control consoles.
- 00:27:20 Bob Lazar shows a map with S-4 located on the north-eastern tip of Papoose Lake. (This is different from locations indicated in other narratives).
- 00:28:00 Bob Lazar displays a sketch of the S-4 facility with nine hangar doors in the mountain side, sloped approx. 60° (In the picture this looks more like 45°, and in later narratives Bob Lazar says 30°). The doors are not flush with the mountain slope, which in the picture is shown as very rugged.
- 00:28:36 An open hangar door is displayed.
- 00:29:00 Bob Lazar explains the mode of operation of the antigravity drive in the Earth’s gravitational field, different from free-space flight.
- 00:29:24 Bob Lazar shows an animation of the operation of the gravity amplifiers.
- 00:29:48 Bob Lazar shows a sketch of the gravitational field around the spacecraft in operation.
- 00:30:25 Bob Lazar states that when operation at maximum distortion of the gravitational field, the spacecraft cannot be seen from any vantage point – it is invisible. (Later narratives states that is invisible only when standing directly below the craft).
- 00:30:45 Bob Lazar talks about projects named “Galileo” (gravitational propulsion), “Sidekick” (particle beam weapons with a neutron source focused by a gravity lens) and “Looking Glass” (physics of seeing back in time).
- 00:31:15 Bob Lazar talks about the “Government Bible”, i.e. the briefings that he had to read while his security clearance was checked on his first day at S-4.
- 00:32:45 Narrative about the Zeta Reticuli star system and the “kids” (the child size aliens).

- 00:34:05 Bob Lazar states that information and hardware were exchanged with the Zeta Reticulans until 1979. (In later narratives, Bob Lazar pretends that he knows nothing about how the US government got hold of the nine flying discs).
- 00:34:25 Bob Lazar talks about the fatal event when attempting to cut an antigravity reactor open in an underground facility at the Nevada (Nuclear) Test Site.
- 00:35:15 Bob Lazar tells that the Zeta Reticulans state that man is a product of an “externally corrected” evolution, and that man has been genetically corrected 65 times. (This narrative does not appear in other statements by Bob Lazar).
- 00:35:50 Bob Lazar explains how he was hired to the program at S-4.
- 00:36:00 Bob Lazar displays a newspaper clipping with an announcement of a Special Colloquium by Edward Teller, Lawrence Livermore National Laboratory: "Shall we Freeze Defensive Nuclear Weapons" (Open to the Public).
- 00:36:35 Edward Teller (very old) is interviewed by an unidentified person, but it is very hard to decode what he says due to background noise. It seems that he is answering to a question about nuclear propulsion, by fission or fusion.
- 00:37:08 Interviewer: "Is there any other nuclear reaction besides fission and fusion that you know of?" Edward Teller: "No".
- 00:37:50 The interviewer asks Edward Teller if he knows Bob Lazar, but he responds by "I will sit silently". (The recording stops abruptly as if Edward Teller's response was cut off before finishing). That it is Edward Teller being interviewed can be confirmed by comparing with the images of Dr. Teller as an old man in the Wikipedia article (near the end): [https://en.wikipedia.org/wiki/Edward\\_Teller](https://en.wikipedia.org/wiki/Edward_Teller)
- 00:39:32 End of video.

## Appendix F – Particle Beam Weapons

Tom Mahood in his article “Particle Beams and Saucer Dreams”, [38], presents the Bragg curve for a 500 MeV proton beam at the altitude of Groom Lake / Papoose Lake. He also presents the Bethe Formula, but in a form in which the physical constants are replaced by compounded numerical values, which makes it more difficult to judge if the formula is correct.

There is at least one error in the data that he uses. This is the effective atomic number  $Z$  of the medium, where he uses  $Z = 14$ .

Atmospheric air is a mixture of 78% nitrogen ( $Z = 7$ ) and 21% oxygen ( $Z = 8$ ), 0.9% argon ( $Z = 18$ ). Therefore, the effective atomic number of this mixture is the weighted sum of the  $Z$  values of the individual components, which leads to  $Z \approx 7.3$  and not 14. He uses a value of the excitation energy of the air:  $I = 92.9$  eV, which is slightly larger than the value used here, but this is not so important.

The Bethe Formula, [E-1], expresses the energy loss of high energy charged particles per distance travelled when traversing a medium. This is also denoted the “stopping power” of the medium.

$$-\left\langle \frac{dE}{dx} \right\rangle = \frac{4\pi}{m_e c^2} \cdot \frac{n z^2}{\beta^2} \cdot \left( \frac{q^2}{4\pi\epsilon_0} \right) \cdot \left[ \ln \left( \frac{2m_e c^2 \beta^2}{I \cdot (1 - \beta^2)} \right) - \beta^2 \right]$$

...where:

$E$  is the energy of the particles (here protons) propagating in the medium along the x-axis

Velocity of the particle	$v$ [m/s]
Relative velocity of the particle	$\beta = v/c$
Velocity of light in vacuum	$c = 2.99792458 \cdot 10^8$ m/s
Rest mass of the electron	$m_e = 9.10938356 \cdot 10^{-31}$ kg
Rest mass of the proton	$m_p = 1.67262192369 \cdot 10^{-27}$ kg
Charge of the particles in the beam	$z = 1$ (proton, multiples of the elementary charge)
Charge of the electron	$q = 1.60217662 \cdot 10^{-19}$ C
Permittivity of vacuum	$\epsilon_0 = 8.8541878128 \cdot 10^{-12}$ F/m
Avogadro's number	$N_A = 6.02214076 \cdot 10^{23}$ mol <sup>-1</sup>
Atomic number of the medium	$Z = 7.3565$ (effective atomic number for dry air), [E-2]
Atomic mass of the medium	$A = 29.087$ (effective atomic weight number for dry air), [E-3]
Density of the medium	$\rho$ [kg/m <sup>3</sup> ]
Molar mass constant	$M_u = 1$ g/mol
Excitation energy of the medium	$I = 85.7$ eV (for dry air)
Electron density of the medium	$n$ [m <sup>-3</sup> ]

The formula for the electron density of the medium, [E-1], reads:

$$n = \frac{N_A Z \rho}{A M_u}$$

To calculate the electron density, we need the formula for the air density vs. altitude for the dry standard atmosphere, [E-2], which reads:

$$\rho = \rho_b \cdot \left( \frac{T_b}{T_b + L_b \cdot (h - h_b)} \right)^{-\left(1 + \frac{g_0 \cdot M}{R^* \cdot L_b}\right)} \quad eq. (1)$$

...where:

Base density of the atmosphere	$\rho_b = 1.225 \text{ kg/m}^3$ (at sea level)
Base temperature of the atmosphere	$T_b = 288.15 \text{ K}$ (at sea level)
Temperature lapse rate	$L_b = 0.0065 \text{ K/m}$ (at sea level)
Geopotential height <sup>#</sup>	$h$ [m]
Universal gas constant	$R^* = 8.3144598 \text{ Nm/(mol}\cdot\text{K)}$
Standard gravitational acceleration	$g_0 = 9.80665 \text{ m/s}^2$
Molar mass of the atmosphere	$0.0289644 \text{ kg/mol}$

<sup>#</sup> Geopotential height is slightly different from physical height/altitude above sea level, but this is immaterial here.

It should be noted that the above formula is a simplified version of the full model of the density of the atmosphere, [E-2]. The above version is valid up to  $h = 11000 \text{ m}$ .

At the altitude of Groom Lake / Papoose Lake:  $h \approx 1350 \text{ m}$ , cf. section 2.7, the air density is then  $\rho = 1.194 \text{ kg/m}^3$ .

Bethe's formula, however, in its standard form is not directly suitable for calculation of the Bragg curve, as the formula uses particle velocity as the input parameter expressed as the ratio of particle speed  $v$  to the velocity of light  $c$ :  $\beta = v/c$ . To derive the Bragg curve, we will need the particle energy as the input parameter. Therefore, we need the relativistic formula for particle energy vs. velocity.

First, we present the formula for the Lorentz factor, [E-4]:

$$\gamma = \frac{1}{\sqrt{1 - \beta^2}} \quad eq. (2)$$

...and then the relativistic kinetic energy formula, [E-5]:

$$E = (\gamma - 1)m_0c^2 \quad eq. (3)$$

...where  $m_0$  is the rest mass of the particle and  $c$  the velocity of light in vacuum.

After a series of simple rearrangements of the relativistic energy formula and inserting the formula for the Lorentz factor, we can derive the relation between particle energy and  $\beta$ :



$$\beta^2 = 1 - \frac{1}{\left(1 + \frac{E}{m_0 c^2}\right)^2} \quad \text{and} \quad 1 - \beta^2 = \frac{1}{\left(1 + \frac{E}{m_0 c^2}\right)^2} \quad \text{eq. (4)}$$

These expressions are next inserted into the Bethe formula, yielding:

$$-\left\langle \frac{dE}{dx} \right\rangle = \frac{4\pi}{m_e c^2} \cdot \frac{nz^2}{1 - \frac{1}{\left(1 + \frac{E}{m_0 c^2}\right)^2}} \cdot \left(\frac{e^2}{4\pi\epsilon_0}\right) \cdot \left[ \ln \left( \frac{2m_e c^2}{I \cdot \frac{1}{\left(1 + \frac{E}{m_0 c^2}\right)^2}} \right) - 1 + \frac{1}{\left(1 + \frac{E}{m_0 c^2}\right)^2} \right] \quad \text{eq. (5)}$$

Now the Bethe formula is expressed with particle energy as the input parameter, which renders it directly useful for calculating the Bragg curve.

With the parameters above, an initial check is to calculate the energy loss rate at  $x = 0$ , at the exit of the accelerator producing protons at  $E_0 = 500 \text{ MeV}$ . This yields:

$$-\left\langle \frac{dE}{dx} \right\rangle = 0.15675 \frac{\text{MeV}}{m}$$

If this rate was constant over the entire trajectory, the range of the beam would be 3190 m.

However, due to the nature of the interaction between the charged particles (here: protons) and the medium as expressed by the Bethe formula, the energy loss rate increases as the protons loose energy by interaction with the molecules of the air, and this is illustrated by the Bragg Curve. The Bragg curve is plotted in Figure E-1 for  $E_0 = 500 \text{ MeV}$  protons at the altitude of the Groom Lake / Papoose Lake area  $h \approx 1350 \text{ m}$ .

It is very evident from this curve that the energy loss per distance traversed (the stopping power) has a sharp and high peak near the end of the range. The range at  $E_0 = 500 \text{ MeV}$  is 1957.28 m. The peak energy loss rate is:

$$-\left\langle \frac{dE}{dx} \right\rangle \Big|_{max} = 97.25 \frac{\text{MeV}}{m} \quad \text{at} \quad x = 1957.28 \text{ m}$$

For this calculation the step size used for integration was 1 cm. The height of the peak in the Bragg curve depends very much on the integration step size, but this parameter is not so important for the particle beam weapon, but it shows that the peak energy loss occurs at the very end of the trajectory.

However, looking at Figure E-3, which shows the proton energy vs. range, it is noted that the protons loose energy nearly linearly with range over most of the range. Near the end, the curve dips steeply towards zero and nearly vertically at the end of the range.

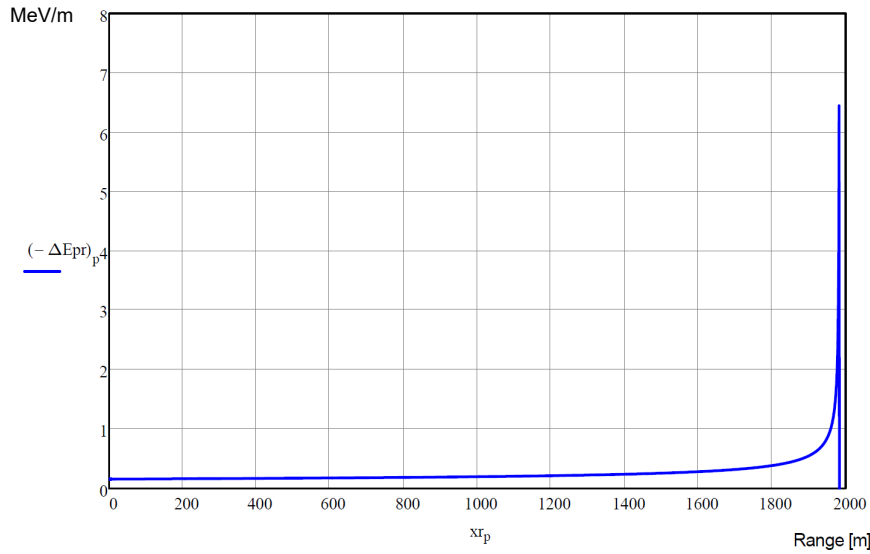


Figure E-1 Bragg Curve for Protons at 500 MeV (1 m integration step size)

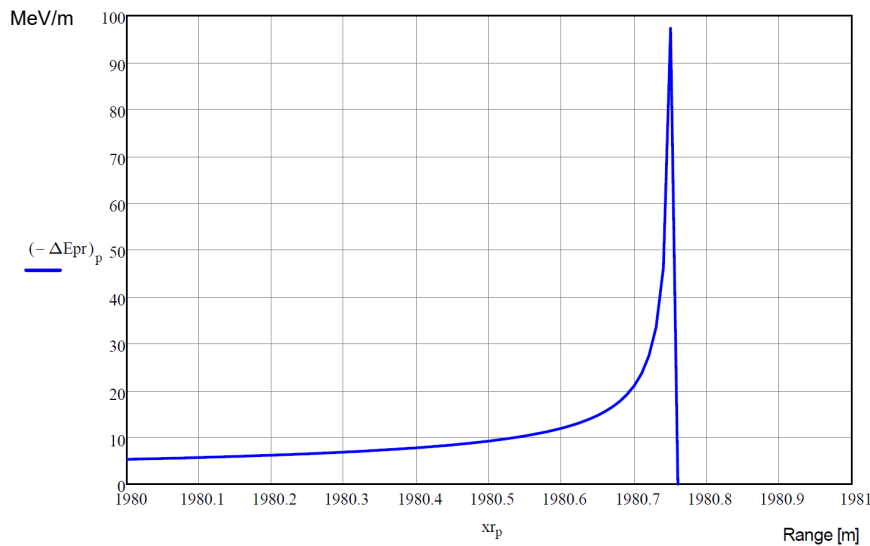


Figure E-2 Last meter Bragg Curve for Protons at 500 MeV (1 cm integration step size)

The Bragg curve calculated by Tom Mahood, [38], gives a beam range of  $\approx 1220$  m which is shorter than the result obtained here, but this is due to the wrong value of effective atomic number of the air that he uses. This error makes his atmosphere more dense than it actually is, and therefore the stopping power is larger and the beam range correspondingly shorter.

Tom Mahood states that the energy loss rate at the accelerator aperture is  $\approx 3$  keV/cm = 0.3 MeV/m, which is twice the value calculated here, and this is in line with the incorrect value of effective atomic number of the atmosphere, that he uses.

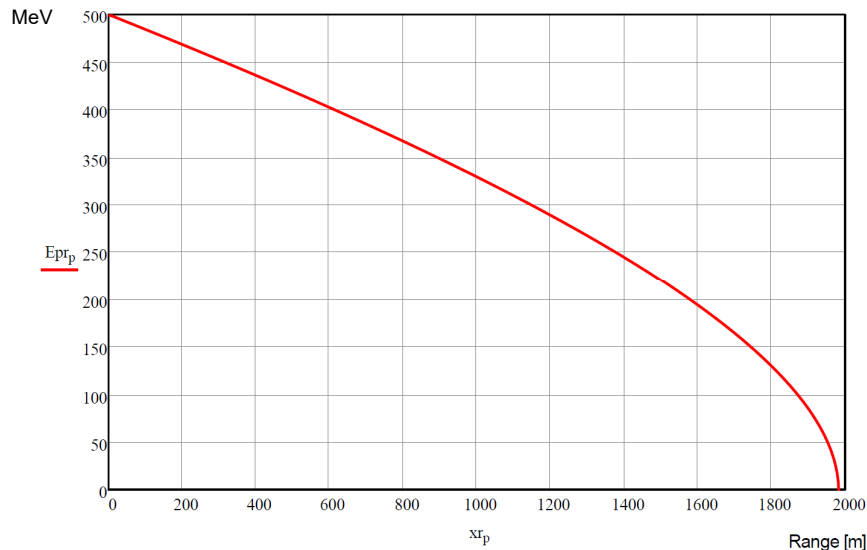


Figure E-3 Proton energy vs. range

Taking a few numbers from the energy curve Figure E-3, one gets a feeling for how much energy is available for ionizing the air near the end of the range, Table E-1.

Table E-1 Energy loss over last x meters range (500 MeV protons)

Last 1 m	$\Delta E = -9.02 \text{ MeV}$
Last 10 m	$\Delta E = -29.05 \text{ MeV}$
Last 25 m	$\Delta E = -46.38 \text{ MeV}$
Last 50 m	$\Delta E = -66.27 \text{ MeV}$
Last 100 m	$\Delta E = -95.09 \text{ MeV}$

1 cm integration step size

It is evident from Table E-1, that only  $\approx 10\%$  of the proton energy is deposited in the last 25 m of trajectory, while  $\approx 90\%$  of the proton energy is lost underway to the last 25 m. This, together with the short range, makes particle beam weapons very inefficient in the atmosphere.

The beam power  $P$  is proportional to the beam current  $I$  and the energy  $E$  of the charged particles:

$$P = \frac{I \cdot E}{z \cdot q}$$

...and  $z$  and  $q$  are the same as defined for the Bethe formula above.

A beam current of 1 mA and 500 MeV protons leads to a beam power  $P = 500 \text{ kW}$ . At 25 m before the end of beam range this is decayed to 46 kW. Thus, a large fraction of the beam power is lost in the trajectory towards the target. However, the objective of particle beam weapons is to make them small enough to be deployed in space and target enemy satellites and spacecraft.

It is not known what the power rating of the accelerator is. The efficiency of linear accelerators is not overwhelming. The Los Alamos Neutron Science Center linear accelerator uses 3 MW radio frequency power at 201.25 MHz to accelerate the protons. The output power of the beam is 780 kW implying an efficiency of 26%. Further, the duty factor is 12% thus reducing the mean output power to 93.6 kW. Data from [E-9]. How much power a weapons grade linear accelerator requires is not known and will not be pursued further here.

The proton beam range vs proton energy has been calculated for different proton energies. This is displayed in Table E-2.

Table E-2 Proton beam range vs. energy

Proton Energy	Range
100 MeV	110.1 m
200 MeV	400.5 m
300 MeV	825.4 m
400 MeV	1352.2 m
500 MeV	1957.3 m
600 MeV	2623 m
700 MeV	3337m
800 MeV	4088m
900 MeV	4870 m
1000 MeV	5675 m

1 cm integration step size

It is evident from Table E-2 that if a 500 MeV particle beam weapon tested at Groom Lake or Papoose Lake shooting upwards at a reasonable elevation angle (say > 30°) and creating a glowing orb of ionized air would be clearly visible to spectators at Freedom Ridge or White Sides. It should be noted that the calculated ranges are for horizontal beams. If shooting upwards at a certain elevation angle, the range will be extended somewhat due to the air density decreasing with altitude.

**Size of the accelerator/particle beam weapon**

Accelerators on Earth are big beasts which are built horizontally and therefore the beams emerging from them are also horizontal. If this was the case of the particle beam weapons demonstrator at Area 51/S-4, there would most likely be nothing to watch from Freedom Ridge or White Sides.

A particle beam weapon for space must be very compact to fit existing launchers, which implies a maximum size of ≈10 m length by ≈4 m diameter. Of this volume a large portion would go to the power supply. Solar panels providing more than 100 kW (around the power level produced at the International Space Station) would be prohibitive. Therefore, a small nuclear reactor could be an option.

The Los Alamos linear accelerator building is about 700 m long measured on Google Earth. The length of the accelerator is then estimated to be about 600 m. The maximum energy of the accelerator beam is 800 MeV, [E-8]. This makes the makes the accelerator performance 1.33 MeV/m, much too small for a particle beam weapon. To fit a 500 MeV proton linear

accelerator inside a launcher, the accelerating gradient would have to be on the order of 100 MeV/m, about two orders of magnitude larger than the LANL accelerator. The so-called laser wakefield accelerator technology has been known since 1979, [E-10], and seems to promise accelerating gradients in the range required for a space-based particle beam weapon, [E-11]. Therefore, based in information from ref [E-10], it seems plausible that a prototype particle beam weapon could have been developed and tested around 1989.

Assuming that a weapons grade, space qualified/qualifiable accelerator was tested at Area 51/S-4, mechanical steering of the beam would be a possibility, creating the impression of a flying disc making strange maneuvers, although the agility when moving a multi-ton object remains limited. Another option is to use bending magnets, but this is only possible if the beam consists of charged particles. By varying the proton energy, the glowing orb could give the impression of nearly instantaneous acceleration.

However, there are too many unknowns in this, and it is not deemed worth the effort to try to dig out more information.

### **Beam divergence**

A beam of protons (or other species of charged particles) would quickly diverge due to electrostatic repulsion between the protons. Additionally, scattering of the protons due to interaction with the air will also contribute to the divergence.

In order to get an effective particle beam weapon, the charged particles must be neutralized at the exit of the accelerator. This is a well-known technology used in electric propulsion engines for satellites where an ionized noble gas like Xenon is accelerated and expelled at high velocity and the beam is neutralized by a beam of electrons with the same charge, thus keeping the satellite electrically neutral.

Several parameters must be known in order to calculate the beam divergence, and these are not available and therefore must be guessed. The interested reader may consult ref. [E-7] for more information on particle beam weapons and beam divergence among all the other topics of relevance to this technology.

The topic of beam divergence will not be pursued further in this issue of the report.

### **How would the “flying disc” appear, seen from Freedom Ridge by the Lazar party ?**

The size of the purported Sports Model flying disc:  $\approx 52$  feet (15.8 m) diameter and  $\approx 15.5$  feet (4.7 m) high, [4] at 00:35:50, would not be a large object on the sky at the  $\approx 35$  km range to Papoose Lake or  $\approx 21$  km to Groom Lake. The viewing angles would be  $\approx 0.025^\circ$  (1.55 arcmin or 93 arcsec) to Papoose Lake or  $\approx 0.043^\circ$  (2.59 arcmin or 155 arcsec) to Groom Lake from Freedom Ridge. For comparison, the full moon subtends a mean viewing angle of  $0.52^\circ$  (31 arcmin).

It should be noted that human visual acuity in daylight is 18-24 arcsec, implying that the flying disc would just be a speckle or blob of light at the night sky to the spectators – provided that the disc was “glowing” in the dark. No details of the “disc” would be visible with the naked eye.

From the Bragg curve it is evident that the energy loss rate of the beam peaks at the last few meters of trajectory, thus creating a plasma cloud of comparable extension. The dimension orthogonal to the beam trajectory is determined by the divergence of the particle beam.

If the true story is that the Bob Lazar night party was witnessing a particle beam weapon test, it is important to know the particle beam divergence to assess the size of the glowing orb.

In ref. [61] about the cyclotron invented by Ernest O. Lawrence, there is an interesting picture in the section “Advantages and limitations”, included here as Figure E-4. This picture shows Lawrence’s 60 inch, 16 MeV cyclotron, where the proton or deuteron (deuterium nuclei) beam is directed through a thin aluminium foil window into the atmosphere.

The 16 MeV beam cause the air to glow with bluish tint. It is also seen that the beam divergence is quite high. The range is a bit difficult to assess, but it seems that the beam stops at about the corner of the metal box above the beam in the left side of the picture.

Using the Bethe formula at sea level (the Lawrence Radiation Laboratory, Berkeley, California is near sea level), the beam range is 3.0 m for protons and 1.51 m for deuterons. As the pole pieces are 60 inches (152 cm) in diameter, the fact that beam terminates near the metal box at left indicates that the beam is actually deuterons.

The Bethe formula calculates the energy loss rate for deuterons at the accelerator exit at 5.33 MeV/m or about 34 times higher than our example 500 MeV proton accelerator above. This implies that the bluish glow from the beam of our 500 MeV accelerator will be much fainter than the glow of the beam from Lawrence's cyclotron. For this reason, it seems reasonable to assume that the beam of the 500 MeV accelerator cannot be seen, only the glowing orb at the end of the trajectory. This also takes into account the substantial distance between the Bob Lazar party and the scene of the particle beam test, thus lending credibility to Tom Mahood's idea that the flying disc test is actually particle beam weapon test.

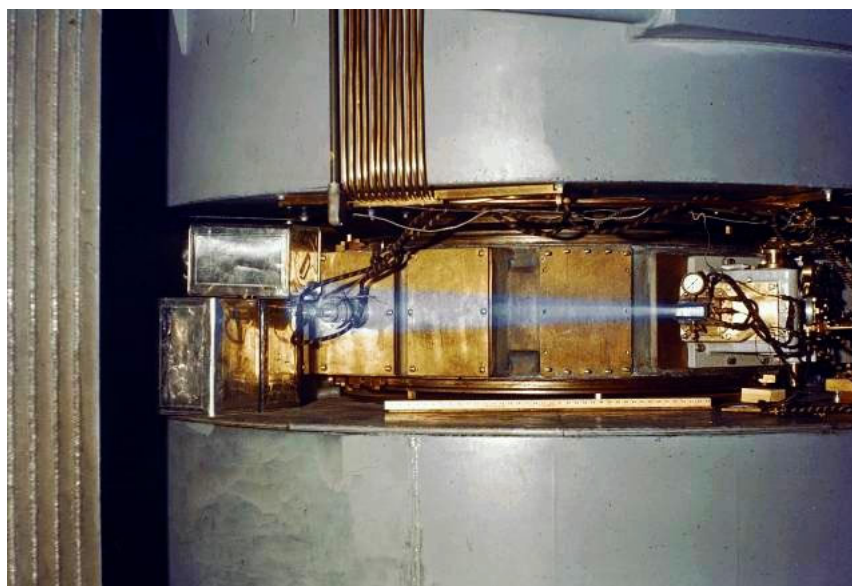


Figure E-4 Bluish glow from a 16 MeV proton or deuteron beam exiting Lawrence's 60-inch accelerator, [61]

It is really tricking to think of why nobody has challenged the contention by Bob Lazar in relation to the flight test parties, that the flying discs emit light, so that they could be seen on the night sky. In none of the interviews with Bob Lazar has he stated that the discs does not emit light apart from the bluish, corona-like discharge emitted when the disc lifts off. This, he states disappears in flight, [5] at 00:43:00.

## References – Appendix F

- [E-1] Bethe Formula  
[https://en.wikipedia.org/wiki/Bethe\\_formula](https://en.wikipedia.org/wiki/Bethe_formula) (Retrieved 2021-10-18)
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## Appendix G – Comments on the “Nuclear Gravitation Field Theory” by Kenneth F. Wright

Though neither discussed in the movie about Bob Lazar, [4], nor the Joe Rogan Experience #1315 interview, [5], nor the George Knapp interview, [6], nor in any other reference to the Bob Lazar story I have identified, it seems that the mysterious “Nuclear Gravitation Field Theory” by Kenneth F. Wright plays a significant part in the Bob Lazar narrative.

Kenneth F. Wright graduated from the US Naval Academy in 1977, [G-35], with a Bachelor of Science in physics and served the US nuclear submarine fleet.

The Nuclear Gravitation Field Theory is described in a document, [8], and a PowerPoint presentation, [9]. Its relation to the antigravity drive of the Sports Model flying disc is described in ref. [7].

Kenneth F. Wright states that he used the next twenty years after graduating from US Naval Academy to develop his Nuclear Gravitation Field Theory, [G-35], thus bringing us to 1997. He seems to have published the first issue of his theory in 1999, [10], and he has updated it in 2012, [10], and again twice in 2016, [8].

Kenneth F. Wright’s website <https://www.gravitywarpdrive.com/> was registered on March 5, 2000, <https://www.whois.com/whois/gravitywarpdrive.com>, which is in agreement with the first issue of his theory.

The Nuclear Gravitation Field Theory claims that the strong nuclear interaction (or force) and gravity are one and the same. He bases his theory on quantum mechanics, Newton’s law of gravity and Einstein’s general relativity theory.

This far-reaching claim would imply that Kenneth F. Wright would have accomplished the “Grand Unification” of gravity and the Standard Model of physics for which physicists have struggled for decades, and for which a Nobel Prize in physics would be imminent. However, Kenneth F. Wright inscribes himself into the big book of self-appointed geniuses who in vain have claimed to falsify achievements of great physicists like Einstein’s general relativity theory and others.

A detailed analysis of his false claims will not be made here, but the seven observations listed below should be enough to dismiss his pseudo-theory:

1. A postulate in this theory is that the speed of gravitational waves is at least 20 billion times the speed of light in vacuum or even infinite. In this claim Kenneth F. Wright references a paper by Tom Van Flandern, [G-1], and [8] page 28.
2. Kenneth F. Wright purports that the universal gravitational constant is not a constant but has a unique value for every isotope of every element, [8] page 55, and that it can be  $10^{50}$  times larger within the nucleus of an atom, [8] page 5.
3. Kenneth F. Wright postulates that the gravitational lensing effect of the sun allows a star directly behind the sun to be seen on either side of the sun and that this was observed in 1919 during the total solar eclipse, [8] page 16. This is nonsense. This would imply that the sun as a gravitational lens would have a focal length of 1 AU (Astronomical Unit).
4. Kenneth F. Wright seems to confuse the Lorentz (length) contraction and time dilation, which are characteristic of the Special Theory of Relativity, with the effects of gravity in the General Theory of Relativity.
5. Kenneth F. Wright cannot even get the velocity of light in vacuum right. He uses the value  $2.9975 \cdot 10^8$  m/s several places in his reports but also other values. Even if he wanted to use an approximate value to five significant digits, the values he employs are wrong. Rounding to five significant digits, the value will come out as  $2.9979 \cdot 10^8$  m/s. Not that it means a lot in terms of numerical precision in this context, but it demonstrates a lack of scientific sense.
6. Kenneth F. Wright has never published peer-reviewed scientific paper.
7. The Nuclear Gravitation Field Theory has never been commented in scientific papers.



**Re 1:** The merger of two neutron stars which occurred on August 17, 2017 and was recorded by the LIGO/VIRGO gravitational wave observatories (the event named GW170817) and 1.7 sec. later as an X-ray and gamma-ray burst by observatories in space (the event named GRB 170817A) constrained the fractional difference between the speed of gravitational waves and the speed of light in vacuum to within  $-3 \cdot 10^{-15}$  to  $+7 \cdot 10^{-16}$ , [118], and thus disproves the claim by Kenneth F. Wright and Tom van Flandern. In [8] page 28 he states: ... *“The only time dependent function in Newton’s Law of Gravity is the gravity acceleration field acting upon a mass of interest at a given position in space, therefore, it is assumed that gravity propagates instantaneously.”* This corollary is nonsense. Isaac Newton had no way to determine if gravity propagated at any speed including infinite, only that it was fast enough to act at the outermost planets of the solar system in a way to enable precise predictions of their orbits. Once the Sun and its planets were created, their gravitational fields at solar system scale were static (ignoring for a moment the accelerated motion of the planets in their orbits) and a velocity of gravitational waves were not required to predict their orbits. The perturbations of planetary orbits by the other planets and their moons could also be calculated to high precision without considering a velocity of gravitational waves. Newton knew about the finite velocity of light based on the research carried out by the famous Danish astronomer Ole Rømer and published in 1676, [G-15]. The only solar system puzzle which defied explanation by Newtonian mechanics was the precession of the perihelion of the orbit of Mercury. The correct prediction of this phenomenon was one for the first successes of Einstein’s theory of general relativity, [G-34].

**Re 2:** This is a very convenient allegation to support his flawed theory, but I have found no scientific evidence that this should be the case.

**Re 3:** Einstein’s Theory of General Relativity predicts that the sun as a gravitational lens has a focal length of 542 AU for rays grazing the solar surface, [G-7], corresponding to a deflection of  $\approx 1.77$  arcsec. This magnitude of deflection was confirmed by observations by Arthur Stanley Eddington of stars during the total solar eclipse on 29<sup>th</sup> of May 1919, [G-8]. For rays passing the sun at a larger separation, the focal length is larger, i.e. the deflection is smaller. This is different from an ordinary optical lens, where the focal length is constant for all rays coming in parallel to the optical axis. The focal length of the solar gravitational lens is about  $3\frac{1}{2}$  times the distance to the farthest away man-made object, the NASA Voyager-1 probe launched on 5 September 1977, now about 157 AU away from the Sun, [G-9].

**Re 4:** In [8] pages 20 to 21 he correctly tabulates the Lorentz factor and its inverse for a range of velocities, even if he does not recognize it as the Lorentz factor in his text. On page 23 he states that: *“In order to “see” or “measure” the Nuclear Gravitation Field propagating outward from the Nucleus omnidirectional in spherical symmetry dropping in intensity  $1/r^2$  consistent with Newton’s Law of Gravity, we would have to measure the field intensity in Uncompressed Space-Time. However, we live in the Compressed Space-Time reference frame, therefore, we see events in Compressed Space-Time”*. He is right in the sense that we live in the gravitational field of the Earth, but it is not clear if this is what he refers to. In pages 24 to 27, he presents a table of *“Accelerated Reference Frame Space-Time Compression Due to Gravity Field”*, but without giving any formulas for his calculations. The table has acceleration from 0 to  $10^{30}g$  or 0 to  $9.81 \cdot 10^{30}$  m/s<sup>2</sup> as the input parameter ( $g$  is the acceleration of the Earth’s gravity field, here taken as 9.81 m/s<sup>2</sup>). He then calculates the *“Final speed of light in Uncompressed Space-Time after 1 Second”* for each value of acceleration and in the next column the *“Length Reduction due to Space-Time Compression”*. The latter quantity is calculated using the Lorentz factor, cf. Appendix F, eq. (2), which indicates that he treats the time dilation/length contraction known from Special Relativity as if it is valid for gravitational effects.

**Re 5:** Even if we wanted to use an approximate value to five significant digits for the velocity of light, the values he employs are wrong. The correct (and exact) value to the full precision is  $2.99792458 \cdot 10^8$  m/s.

**Re 6:** A search using Google search on the Internet and a query to scientific databases using the search facility of the Library of the Technical University of Denmark, [136], revealed nothing.

**Re 7:** A single article has been retrieved which discusses the Nuclear Gravitation Field Theory, [G-5]. This article rejects the claim by Kenneth F. Wright. The strange thing with this article is that on the <https://studylib.net/> website, where it appears when searching via Google, it is claimed to be published in an issue of Physical Review Letters, dated 14 November 2003. On the Physical Review Letters website this article does not appear in the table of contents of the Volume 91, Issue 20, 14 November 2003 !! Neither does it appear by a search with the title or the author's name, so this seems very suspicious. Therefore, I am not very inclined to state that the Nuclear Gravitation Field Theory has been commented in a scientific paper.

### Two Protons in contact

To put things in perspective, I first calculate the electrostatic forces acting between two protons in contact, and next the gravitational force for the same configuration.

Velocity of light in vacuum	$c = 2.99792458 \cdot 10^8 \text{ m/s}$
Rest mass of the proton	$m_p = 1.67262192369 \cdot 10^{-27} \text{ kg}$
Diameter of the proton and neutron	$d_p = d_n = 1.6836 \cdot 10^{-15} \text{ m} = 1.6836 \text{ fm}$
Rest mass of the neutron	$m_n = 1.67492749804 \cdot 10^{-27} \text{ kg}$
Charge of the electron (and proton)	$q = 1.60217662 \cdot 10^{-19} \text{ C}$
Permittivity of vacuum	$\epsilon_0 = 8.8541878128 \cdot 10^{-12} \text{ F/m}$
Universal gravitational constant	$G = 6.67430 \cdot 10^{-11} \text{ Nm}^2\text{kg}^{-2}$

When two neutrons or two protons are in contact their centers are separated by their diameter.

Newton's law of gravitation:

$$F_G = G \cdot \frac{m_1 m_2}{r^2} = G \cdot \frac{m_p^2}{r^2} = 6.5875 \cdot 10^{-35} \text{ N}$$

Coulomb's law of electrostatic attraction or repulsion:

$$F_C = \frac{q_1 q_2}{4\pi\epsilon_0 r^2} = \frac{q^2}{4\pi\epsilon_0 r^2} = 81.3925 \text{ N}$$

This result implies that the electrostatic repulsion is about  $10^{36}$  times stronger than gravitational attraction.

One quantity, which is the key to understanding the corollary of Kenneth F. Wright is the acceleration felt by the protons. Using Newton's second law  $F = m \cdot a$  where F is the force acting on an object with mass m and a is the acceleration, we get for the gravitational acceleration:

$$a_G = \frac{F_G}{m_p} \Rightarrow a_G = 3.93845 \cdot 10^{-8} \frac{\text{m}}{\text{s}^2}$$

...and for the acceleration due the electrostatic Coulomb repulsion:

$$a_C = \frac{F_C}{m_p} \Rightarrow a_C = 4.866162 \cdot 10^{28} \frac{\text{m}}{\text{s}^2}$$

The result by Kenneth F. Wright is lower by a factor  $\approx 2$ , as he uses an incorrect value for the radius of the proton, [8] page 13.

The strong nuclear force or strong interaction must of course be significantly larger than electrostatic repulsion to keep the nucleus from fragmenting.

The strong interaction is actually two manifestations of the same fundamental force. Protons and neutrons are composed of quarks, [G-10], [G-11], and these are held together by the nuclear force, also denoted the color force, [G-12], from the theoretical framework of Quantum ChromoDynamics (QCD), which explains the strong interaction in the Standard Model of physics, [49]. Inside the protons and neutrons, the strong interaction is mediated by gluons. The force keeping the nucleons of an atomic nucleus together is the other manifestation of the strong interaction, also denoted the residual strong force, which is mediated by pions, [G-12].

While it should be straightforward to calculate the electrostatic and gravitational forces by any high school student, the calculation of the strong nuclear force between two nucleons is not for amateurs. In 2007 scientists at the School of Science, University of Tokyo used the IBM BlueGene/L supercomputer to calculate the nuclear force between the simplest nuclear configuration: a proton and a neutron (the nucleus of Deuterium), see Figure G-1, adopted from [G-13].

Note that the graph shows the potential energy function of the force and not the force itself. Positive values are repulsion and negative values are attraction. Note also that  $10^{-13}$  cm = 1 fm =  $10^{-15}$  m.

From the graph it can be seen that the nuclear force is repulsive at very close proximity, while it changes to attractive at approx. 0.5 fm separation. The minimum potential energy occurs at around 0.7 fm separation, and it then quickly vanishes for separations above 1 fm.

According to [G-12], the nuclear force is approx. 137 times as strong as the electrostatic force or about  $10^{38}$  times stronger than gravitation.

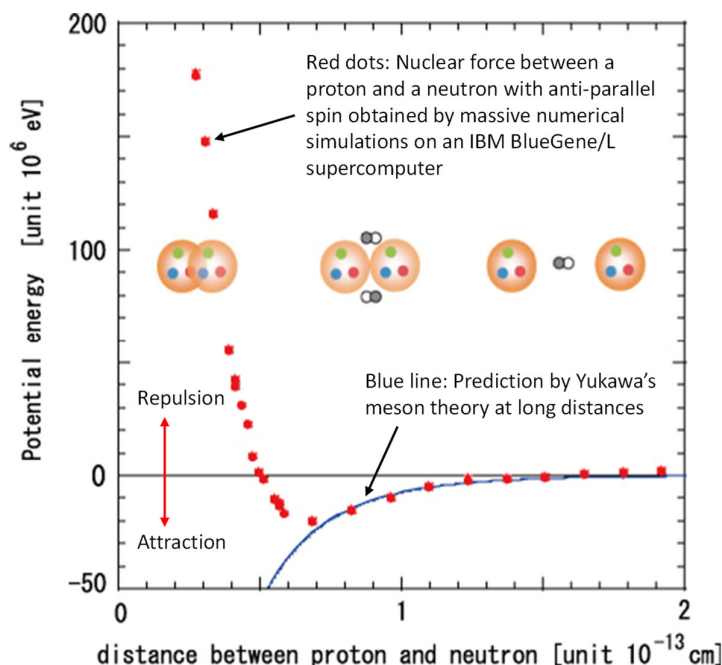


Figure G-1 Nuclear force potential energy function for a proton and a neutron in close proximity, from [G-13], annotated.

Now, how does Kenneth F. Wright in his theory make the force of gravitation about  $10^{38}$  times stronger than the result above?

The value of the acceleration by the Coulomb repulsion between two protons in contact obtained by Kenneth F. Wright is  $2.441 \cdot 10^{27}$  g or  $2.39462 \cdot 10^{28}$  m/s<sup>2</sup>. This is one of the highlighted entries in his table [8] pages 24-27, cf. the discussion under "Re 4" above. Based on this input he calculates a "Space-Time Compression Factor" of  $7.98873 \cdot 10^{19}$ . and he then concludes on page 28 that: "*The characteristic "vanishing" of the Strong Nuclear Force at the surface of the Nucleus can only occur if the Strong Nuclear Force accelerates light, therefore, the Strong Nuclear Force must be Gravity.*" - and - "*The Nuclear Gravitation Field intensity drops about 19 decades just outside the Nucleus before the gravitational field can be "seen" or "measured" propagating outward from the Nucleus because we observe the Nuclear Gravitation Field in a Compressed Space-Time reference frame.*"

This is concluded by Kenneth F. Wright without justification other than the misinterpretation and incorrect intermingling of Special and General Relativity.

This should be sufficient to dismiss his flawed theory, but I find it appropriate to include a few other blunders by Kenneth F. Wright from [8]:

Page 9, middle

*"Nuclei with the number of Protons and/or Neutrons greater than or equal to 50 will have a classical shape that matches a near perfect sphere. Therefore, if the Strong Nuclear Force and Gravity are the same, ..."*

Page 11, below middle

*"When the number of Protons and Neutrons in the Nucleus each number 50 or greater, the classical shape of the Nucleus is a near perfect sphere."*

These two allegations are only true in certain cases for heavy elements.

Page 14, middle

*"In order to determine whether or not the Nuclear Gravitation Field at the surface of the nucleus has an intensity great enough to result in observable General Relativistic effects, one must compare the Nuclear Gravitation Field at the surface of the nucleus to the gravitational field in the vicinity of the Sun's surface and in the vicinity of the surface of a Neutron Star."*

I fail to realize how this provides much new recognition.

Page 22, bottom

On page 22 he has a strange corollary: "*The evaluation, above, discusses Space-Time Compression as a function of a constant relativistic velocity, therefore is an evaluation of a inertial reference frame. General Relativity includes the evaluation of accelerated reference frames. Gravity fields establish accelerated reference frames because gravity accelerates light, electric fields, and magnetic fields. Therefore, gravity fields, generate the Compressed Space-Time due to the acceleration of light, electric fields, and magnetic fields. Since the speed of light will always be measured as propagating at a constant speed of  $2.9975 \times 10^8$  meters/sec, the distance traveled is reduced by the Space-Time Compression Factor. Light, Electric Fields, and Magnetic Fields propagate based upon Compressed Space-Time.*"

Page 28, top

*"In accordance with the article "The Speed of Gravity – What the Experiments Say" by the late Associate Professor Tom Van Flandern, gravity propagates at least 20 billion times faster than light and may propagate instantaneously." ... "The only time dependent function in Newton's Law of*

*Gravity is the gravity acceleration field acting upon a mass of interest at a given position in space, therefore, it is assumed that gravity propagates instantaneously.*

This is bullshit. See discussion under "Re 1" above. The paper by Tom van Flandern, [G-2], and his idea of the speed of gravitational waves propagating at infinite speed has irrevocably been falsified by the neutron star merger and gravitational wave event GW170817 and the associated gamma-ray burst GRB 170817 as discussed in section 4.3.2.

Page 28, below middle

*"The characteristic "vanishing" of the Strong Nuclear Force at the surface of the Nucleus can only occur if the Strong Nuclear Force accelerates light, therefore, the Strong Nuclear Force must be Gravity."*

I find this a very strange corollary.

Page 28, bottom

*"The Nuclear Gravitation Field intensity drops about 19 decades just outside the Nucleus before the gravitational field can be "seen" or "measured" propagating outward from the Nucleus because we observe the Nuclear Gravitation Field in a Compressed Space-Time reference frame."*

See discussion under "Re 4" above.

Page 29, top

*"The diameter of the Proton is  $2.40 \times 10^{-15}$  meter, therefore, the radius of the Proton is  $1.20 \times 10^{-15}$  meter."*

This is wrong. The diameter of the proton is  $\approx 1.68 \cdot 10^{-15}$  m = 1.68 fm (femtometer), [G-10].

In [8] pages 35 to 42 Kenneth F. Wright makes a strange exercise to analyze electrons released from a Sodium (Natrium) metal surface by the photoelectric effect. He performs this analysis as if the photoelectric effect is a macroscopic effect, while it is actually a quantum mechanical effect.

On page 40 he states: *"The amount of energy required to liberate an electron from the Sodium atom is on the order of 0.5 eV"*. This is wrong. If he refers to the first ionization energy of an isolated atom of sodium the value is 5.1391 eV, [G-16]. If he refers to the work function of a sodium surface used as a photocathode, the accepted value seems to be 2.28 eV, [G-17].

Page 39, top

*"The diameter of a proton or neutron is about  $1.0 \times 10^{-15}$  meter."*

Again, Kenneth F. Wright is wrong, using another value than he does on page 29

Page 40, middle

*"The vast difference in magnitude of the energy that the electron would absorb based upon Classical Physics to the amount of the energy the electron will absorb by Quantum Mechanics is extremely important. It is quite reasonable to assume that this significant relative difference in magnitude of field intensity can also apply to the intensity of the Nuclear Gravitation Field."*

This is a completely unjustified conclusion.

Page 42, top

*“The higher the energy associated with an energy level, the narrower the bandwidth, the lower the energy associated with an energy level, the broader the bandwidth.”*

It is not clear what he means by bandwidth in this context.

**Then comes a series of unjustified allegations:**

Page 43, top

*“The virtual vanishing of the Strong Nuclear Force just outside the Nuclear Surface is the primary indicator the Strong Nuclear Force is Gravity because of the intense Space-Time Compression taking place.”*

Page 43, middle

*“If the Strong Nuclear Force had nothing to do with Gravity, no such accelerated field would be produced within the Nucleus affecting the propagation of Light, Electric Fields, or Magnetic Fields and Space-Time Compression would be non-existent.”*

Page 43, bottom

*“If the Strong Nuclear Force had nothing to do with Gravity, then the Strong Nuclear Force would continue to rise in intensity and remain more intense than the Nuclear Electric Field.”*

Page 49, bottom

*“The equations for the acceleration fields established by the Strong Nuclear Force and the Coulombic Repulsion Force within the Nucleus demonstrate the Strong Nuclear Force must be gravity.”*

Page 50, bottom

*“Drop-off of SNG-WSTC results in the apparent “saturation” of the Strong Nuclear Force and has a profile appearance similar to Binding Energy per Nucleon curve as indicated by Figure “Binding Energy Per Nucleon,” below.”*

Here Kenneth F. Wright presents a set of curves based on his calculations of which the “Net Nuc. Accel. Field” curve is compared with the established curve for binding energy per nucleon for the elements from Hydrogen to Uranium. However, I find the similarity to be an unjustified postulate.

Page 52, bottom

*“The Nuclear Gravitation Field for Lead-208 is relatively strong and Space-Time Compression next to the Nuclear Surface is very significant compared to average stable nuclei.”*

Page 55, top

*“If the outcome of performing these Cavendish Experiments results in determining that the value for  $G_{Bi}$  is greater than the value for  $G$  (Universal Gravitation Constant) which is greater than the value for  $G_{Pb}$ , then this outcome will provide compelling evidence the Strong Nuclear Force and Gravity are one and the same. The Universal Gravitation Constant is, therefore, not Universal but specific to every isotope of every Element.”*

Here Kenneth F. Wright purports that Bismuth used in the Cavendish experiment to establish the value of  $G$  would come out with a higher  $G$  than other materials. This is pure fantasy, cf. [G-14].

## Kenneth F. Wright and Bob Lazar

The above analysis and rejection of Kenneth F Wright's "Nuclear Gravitation Field Theory" as a crackpot theory, would be waste of time except for the fact that Kenneth F Wright and Bob Lazar know each other and supports each other, which has led Bob Lazar to adopt elements of the "Nuclear Gravitation Field Theory" in his story. This is documented in the report "*Gravity Warp Drive, Making Star Trek a Reality! Supporting Documents. For the Development of the Nuclear Gravitation Field Theory and Gravity Field Propulsion*", [7], by Kenneth F Wright, hereafter referred to as "Supporting Documents".

The downloadable document, [7], is dated April 10, 2000 on the front page, but several facts presented inside it have dates up to 2016, and the PDF file is time-stamped 18-04-2021, so it seems that Kenneth F Wright updates the document from time to time without changing the date on the front page. Further, the document seems to be a collection of articles put together in this document. The report opens with two chapters about his motivation for developing his so-called "Nuclear Gravitation Field Theory".

One of his motivations to become interested in UFO's was the Betty and Barney Hill incident in 1961 based on an article in the December 1974 issue of Astronomy Magazine, [G-21]. The alleged abduction of Betty and Barney Hill by aliens from the fourth planet of the Zeta 2 Reticuli star system is one of the key stories of the UFO lore, which also sets the center stage of the Bob Lazar story.

The Betty and Barney Hill story is detailed in [G-20], so I will not use much writing space here to repeat it. The origin of the Zeta 2 Reticuli home of the aliens is a star map drawn by Betty Hill under hypnosis two years after the "abduction" event. She claimed that she had seen a 3D star map during their abduction to the alien starship and was told by the aliens that it was a map of their stellar neighborhood including our solar system. Apparently both Betty and Barney Hill suffered amnesia after the abduction event, but under hypnosis she could draw a detailed star map. The map was subsequently analyzed by a schoolteacher Marjorie Fish, which had a solid background in astronomy. Ms. Fish identified the Zeta Reticuli star system based on data from the Gliese catalog of nearby stars, [G-23].

Working over a period from 1968 to 1973 doing meticulous pattern matching, Ms. Fish succeeded in identifying Zeta 2 Reticuli as the "home" star system of the aliens. The Gliese star catalog was the best available at that time, but by the completion of the Hipparcos star catalogue in 1997, a much more accurate and comprehensive mapping became available.

This led the Armagh Observatory and Planetarium to perform a new analysis based on the Hipparcos catalogue. This was published on August 19, 2011, and based on this, the Marjorie Fish analysis actually fell apart. Ms. Fish herself late in her life also became skeptical about the accuracy of her own analysis.

Also, the reliability of the information given by Betty and Barney Hill during hypnosis has been strongly contested.

It is strongly recommended to read the two references [G-21] and [G-22].

However, the Zeta 2 Reticuli star system and the alien "Greys" which is the name sticking to the story, based on the description given by Betty Hill during hypnosis, will probably live forever in the UFO lore.

Chapter III contains an account of Kenneth F. Wright's "Nuclear Gravitation Field Theory" similar to the one given in ref. [8], but with less detail. However, the same allegations about gravity prevail.

Chapter IV is an account of the Bob Lazar story with lots of detail about the Sports Model flying disc. On page 4-4 an alleged Soviet spy satellite photo of the Sports Model disc is shown and its geographical coordinates 37° 01' 40" N 115° 46' 35" W (37.027778°N 115.776389°W) place it at the bottom of a valley about 8 km southwest of Papoose Lake. However, this position does not match the location of S-4 as described by Bob Lazar, cf. discussion in section 2.7. This displacement could

of course be due to a test flight of the disc, but according to Bob Lazar, these test flights were only carried out by night, so the appearance of the disc at daytime seems mysterious.

In this chapter we also find the first mention of Gravity A and B: *“Gravity is actually two waves, identified as gravity A and gravity B. Gravity A is at the atomic level. That is, the wave does not extend beyond the molecular bond except in Element 115 (super-heavy trans-Uranic element with 115 protons). This slight extension allows the wave to be accessed and amplified. Gravity A is currently called the strong nuclear force”*. See discussion in section 4.2.

On page 4-8 Kenneth F. Wright states: *“I had the opportunity to talk to Bob Lazar about the design and operation of the Matter/Anti-Matter Reactor aboard the “Sport Model” Flying Disc during the Memorial Day Weekend, May 2000”*. (Memorial is the last Monday of May in the US).

This meeting apparently marked the beginning of a friendship between the two, which led to Bob Lazar to give a lot of detail of his story to Kenneth F. Wright. These details including several pictures of Bob Lazar’s scale model of the antigravity reactor are found in the report.

The description of the Sports Model flying disc prevails through chapters IV to IX intermingled with Kenneth F. Wright’s own theories. Again, he cannot get the velocity of light in vacuum right, this time using  $2.99973 \cdot 10^8$  m/s. It is also in these chapters that it becomes evident that parts of the report is written many years after the publication date on the front page. This becomes clear when he mentions the official name Moscovium given to element 115, which was approved by the International Union of Pure and Applied Chemistry (IUPAC) 28 November 2016. See e.g. chapter V.

On pages 5-20 to 5-22 Kenneth F. Wright discusses the antigravity properties of Bismuth and its homologue in the periodic table of the elements: Moscovium. Central to these allegations are US patents 3,625,605 and 3,626,606, which are discussed in this report Appendix J. On the middle of page 5-22, Kenneth F. Wright repeats his allegations about the existence of two gravitational constants.

I will not attempt here to comment all the outrageous allegations purported by Kenneth F. Wright, in his “Supporting Documents” report but only highlight a few. In most of his “Supporting Documents” report, he repeats the allegations forwarded in his “Nuclear Gravitation Field Theory” report [8].

Page 4-9, bottom

*“A news article from the April 3, 2001, issue of the New York Times indicates that photos of a distant Supernova taken by the Hubble Space Telescope may provide the evidence that “Negative Gravity,” that is, a repulsive gravitational field, can exist. This article is titled, “Photo Gives Weight to Einstein’s Thesis of Negative Gravity.””*

With this reference, [G-25], Kenneth F. Wright seeks support to the purported antigravity produced in the reactor of the Sports Model flying disc as claimed by Bob Lazar. However, the title is misleading as the article describes dark energy, which in its simplest form is described by the famous cosmological constant  $\Lambda$  which Einstein added to his field equations of general relativity, [G-26], [G-27].

Page 4-13, top

*NOTE 2: Robert Lazar claimed that gravity propagates instantaneously. If one thinks about that, it actually makes perfect sense logically. Gravity warps or bends space and time. We measure the speed or velocity of an object by observing the distance that the object travels in a given time interval. If the very parameters that we use to measure distance and time are significantly affected by strong gravitational fields, then it would be impossible to actually define a finite speed to the propagation of gravity. A recent article, “Rethinking Relativity,” had stated that Associate Professor Tom Van Flandern from the University of Maryland issued a document, “The Speed of Gravity – What the Experiments Say,” demonstrating that gravity propagated at least 20 billion times faster than light and may very well propagate instantaneously.*



This is a repeat of the allegation from Kenneth F. Wright's "Nuclear Gravitation Field Theory" report, [8], as discussed above.

Page 7-5 middle

*The flux of antimatter particles produced in the reactor are channeled down an evacuated, tuned tube (which keeps it from contacting with the matter that surrounds it) and reacted with a gaseous matter target.*

What Kenneth F. Wright means by an "evacuated, tuned tube" is not clarified. See my discussion in section 4.6.

Page 8-5 bottom

*The extension of the periodic system into various new areas is investigated. Experiments for the synthesis of superheavy elements and the predictions of magic numbers are reviewed. Further on, investigations on hypernuclei and the possible production of antimatter-clusters in heavy-ion collisions are reported. Various versions of the meson field theory serve as effective field theories at the basis of modern nuclear structure and suggest structure in the vacuum which might be important for the production of hypermatter and antimatter.*

*A tremendously rich scenario of new nuclear structure emerges, with new magic numbers in the strangeness domain and new forms of nuclear clusters combined of  $p$ ,  $n$ ,  $\Lambda$ ,  $\Sigma$ ,  $\Xi$ , etc. The production mechanisms for these objects and for antinuclei rest in high energetic heavy ion collisions.*

The second paragraph is a quotation from the abstract of the referenced article by Walter Greiner, [G-28]. The article exists in two versions, one from 1995 and an updated and enlarged version from 1996. I was only able to retrieve a copy of the 1995 version. The first part of the quote may be from the 1996 version. However, Walter Greiner among many other topics of the periodic system of elements deals with antimatter production via heavy-ion collisions, which is a completely different mechanism than purported by Bob Lazar for the antimatter production in the antigravity reactor. I discussed this topic in section 4.6.

Chapter XI

In this chapter Kenneth F. Wright attempts to justify the existence of a fourth planet at a habitable distance from Zeta 2 Reticuli by employing the (Titius-)Bode law, [G-29], and Kepler's 3<sup>rd</sup> law, [G-30], based on the alleged detection of a Jupiter-sized planet orbiting 0.14 AU from the star.

According to Kenneth F. Wright the Bode law says that the distance of planets 2, 3 and 4 have semi-major axes which doubles for every planet, i.e. semi-major axes of 0.14 AU, 0.28 AU, 0.56 AU and 1.12 AU. However, the Bode law according to [G-29] places the four innermost planets of the sun at distances 4, 7, 10 and 16 units.

Furthermore, the 1996 detection of a "hot Jupiter" planet at 0.14 AU from Zeta 2 Reticuli turned out to be an asymmetric debris disc based on further observation in the years after, [G-31], [G-32]. Until now no planets have been detected around the Zeta Reticuli star system.

Based on these facts, the existence of a fourth, habitable planet around Zeta 2 Reticuli is pure fantasy.

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## Appendix H – The Identimat 2000 Hand Scanner

The story of the hand scanner plays a big part in several narratives about Bob Lazar, including these:

- The movie by Jeremy Corbell “Bob Lazar: Area 51 & Flying Saucers”, [4], Appendix A
- The Joe Rogan Experience #1315 – “Bob Lazar & Jeremy Corbell”, [5], Appendix B
- The “Flyvende tallerken” (Flying saucer) Podcast Episode 13, [14], Appendix D

The hand scanner is presented as a top-secret military technology, particularly in ref. [14], where Jeremy Corbell makes a big deal out of talking about the glimpse of the hand scanner shown in the Steven Spielberg movie “Close encounters of the third kind”, and that the US military deliberately brought in and revealed top secret props like this to the film studio to introduce authenticity. This is simply wrong.

A picture of the hand scanner and a still image from “Close encounters of the third kind”, is shown in the YouTube video, [H-1], at 02:09 and 02:36. The same image with some data and an explanation of the working principle is also shown in [H-2]. See Figure H-1 to the right.

The hand scanner certainly looks like a technology of the 1970'ies, but it is a commercial product used in many other locations than top-secret military installations. The name of the scanner is Identimat 2000 by Identimation Inc., New York. The price is stated to be USD 4000.00, which would be about triple as much at today's price level.

The “Handbook of Biometrics“ from 2008, [H-3], has a chapter on hand geometry recognition explaining on more detail the working principles.

Finally, if there should be any leftover doubt that the Identimat 2000 hand scanner was a commercial product known by the public, an excerpt of an article “New ID Device Makes Hand a Positive Proof” published in the Austin American, Austin, Texas, Thursday 06 April 1972, Page 58, [H-4], is shown below. The article discusses both its application as an authentication device for access control including military installations, check-in and check-out of employees at work, cash dispensers and forebodes its use in a cashless society.

A June 1980 report by the US Army, [H-5], has a chapter about the Identimat 2000 hand scanner, thus clearly demonstrating the interest by the US military.

A 2010 presentation entitled “A (condensed) Modern History of Biometric Testing in the US”, [H-6], cites a 1972 test of the Identimat 2000: “14% of personnel tested were consistently rejected” (slide 8), which does not demonstrate very high reliability of authentication. It also presents an unidentified newspaper article entitled “Army Tests ATM's for Paying Salaries”, which shows a picture of the Identimat 2000 (slide 13).



Figure H-1 Identimat 2000 Hand Scanner

Page B14—Austin, Texas

## New ID Device Makes Hand a Positive Proof

NORTHVALE, N.J. — Remember when fortune tellers were the only people reading hands?

Now almost anyone — banker, jewel merchant, stock broker, armed guard, department store clerk, automatic check cashing machine, time clock, armored doorway, and even a third generation computer — before acting is likely to say, "Show me your hand."

If your hand tells the right story, hundreds of things become possible instantly.

If your hand matches the story on your ID card, a banker in Hong Kong, even though he has never seen you before, can instantly extend to you the same credit you receive from your Main Street banker at home.

If you need a little something like diamond earrings for a new friend in Paris where, up till now, you have been a stranger, show your hand and ID card at Pierre's Bijou. Voila! It's springtime in Paris all year round!

Behind these happy developments are a discovery and an invention. The discovery, made in the course of a study done by Stanford Research Institute for Identification Corporation showed that the geometry of the human hand was a virtually unique personal characteristic. The invention, the Identimat 2000 (R), is an electromechanical device which can measure the unique geometry of a human hand and encode the measurement along with other required information on an ID card. Only when the hand which is entitled to the privileges encoded on the card



**IDENTIMAT — NEW IDENTIFICATION DEVICE**  
Employee checks in using hand instead of card

his Identimat 2000 ID card is "in" and hasn't been punched in as a favor by a buddy.

Because the Identimat 2000 ID card, in effect, guarantees the signature on a check, automatic and even 24-hour check cashing operations become a fairly simple function. During banking hours the automatically operated check casher can serve to eliminate the long lines that plague today's busy banks. Regular customers who simply desire to cash a check need only offer their hand and card to the Identimat 2000 and after a split-second review of their

installation makes it possible for a physician to get full clearance to patient records, a nurse to get restricted clearance, and clerical help to see only that part of the patient's record required for billing purposes.

How does Identimat 2000 work

1. Based on a statistical study of hand measurements made by Stanford Research Institute, under contract to Identification Corporation, it was concluded that hand geometry is a distinct human, measurable characteristic which can be related to individuals.

Only the upper 1/3 of the article, [H-4], is shown

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## Appendix J – U.S. Patents 3,626,605 and 3,626,606

These patents are the weirdest patents I have ever studied in my career. Patent language uses ordinary English words, but put together in a way that defies normal writing. Therefore, understanding the meaning of a patent text, can be a very hard exercise. This is particularly the case with these two patents.

The two patents are issued to Henry W. Wallace and are dated December 14, 1971.

These are the titles:

3,626,605 Method and Apparatus for Generating a Secondary Gravitational Force Field, [J-1].

3,626,606 Method and Apparatus for Generating a Dynamic Force Field, [J-2].

Patent 3,626,605 deals with a complex method for creating what is denoted a “Secondary Gravitational Force Field”, but actually it is about an antigravity drive. The patent claims that elements of the periodic table which has half-integer nuclear spin, has special properties:

Column 1, page 7: *“The initial evidence indicates that this non-electromagnetic field is generated as a result of the relative motion of bodies constituted of elements whose nuclei are characterized by half integer “spin” values, with the spin of the nuclei being associated with the net angular momentum of the nucleons thereof”.*

Spin is a property of the nucleus of an element, not the electron cloud surrounding it. This spin effect is used in Magnetic Resonance Imaging. If the number of neutrons **plus** the number of protons in the nucleus is odd, then the nucleus has a half-integer spin (i.e. 1/2, 3/2, 5/2), [J-3].

In the above quote, the “... result of the relative motion of bodies ...” means that a flywheel-like disk made from half-integer nuclear spin material is spinning at high speed w.r.t. a closed “circuit” also made from half-integer nuclear spin material. In the patent the material used is a brass alloy consisting of 89% copper, 10% zinc and 1% lead. Natural copper is composed of two stable isotopes: 69.15% <sup>63</sup>Cu and 30.85% <sup>65</sup>Cu, which both have half-integer nuclear spin, [J-4]. Natural zinc however, is composed of only 4.0% <sup>67</sup>Zn with half-integer nuclear spin, while the remainder are isotopes with no spin, [J-5].

Another quote from column 1 page 7: *“For purposes of the present invention the field, generated by the relative motion of materials characterized by a half integer spin value, is referred to as a “kinemassic force field”* (my emphasis). Kinemassic is a concept only found in these two patents.

The really weird thing about this patent is that the claimed gravitational effect, the kinemassic force field, is justified entirely by a very complex verbal description. **There is no mathematical/physical derivation of the kinemassic force field !!!** However, this is typical of crackpots. They are rarely capable of putting their “theories” into a mathematical/physical framework.

It is an enigma to me that a patent covering an effect of physical properties of certain elements or materials can be issued without a solid physical derivation. The patent text is just one long story, which attempts to convince you (and the patent authorities) that the purported effect will materialize.

The patent contains detailed drawings of the apparatus devised to demonstrate the effect. The fact that a graph (Figure 6, page 4) of measurements, which is claimed to prove the effect, is included in the patent, seems to justify that the apparatus has actually been built. However, the demonstrated effect is very feeble and not convincing in my view.

Despite the long, verbose justification of the effect of the kinemassic force field, I am in no way convinced that it exists.

However, it is very puzzling that a completely different apparatus is described starting from column 11, page 12 and illustrated in Figure 7. This apparatus is actually claimed to be an antigravity drive!!! Here, the preferred material is Bismuth, consisting entirely of the isotope <sup>209</sup>Bi, which has half-integer nuclear spin, [J-6]. Bismuth belongs to group 15, the pnictogens, of the periodic table of elements, the same group as Moscovium !!! This is why Kenneth F. Wright is so keen on these two patents as



discussed above. If Bismuth has the purported anti-gravity effect, then Moscovium, the next homologue element of the periodic table must possess an even stronger anti-gravity effect, at least in the minds of Kenneth F. Wright and Bob Lazar.

The puzzling turn of the patent description based on the apparatus shown in Figure 7 leaves you with the thought: Has this apparatus ever been built ?? ... and if it works, why don't we all have flying cars based on this anti-gravity drive ??

The only conclusion I can reach is that these patents are forgeries and that the U.S. patent authorities fell for the gambit.

According to [J-7], no independent testing or public demonstration of the devices described in these patents have been performed.

U.S. Patent 3,626,606 is basically the same idea as 3,626,605 and I will not deal with this in detail.

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**May the Force be with you**