“NEUTRON” vs. “STROBE” STARS?

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Electric Universe Theory (EUT) offers serious objections to the current concept of pulsars (neutron stars) as almost unbelievably dense, very small diameter, possibly incredibly rapidly rotating, collapsed star cores with densities comparable to an atomic nucleus, composed entirely of neutronium. Objections are both physical, phenomenological and geometrical/mathematical. This paper examines the last set, geometrical/mathematical, comparing what might derive from the current theory with that postulated by EUT, namely that “pulsars” are really binary “strobe” stars.

1. Introduction

Electric Universe Theory (EUT) questions the current explanation for a pulsar (neutron star) as “a highly magnetized, rotating neutron star that emits a beam of electromagnetic radiation (see Figure 1). This radiation can be observed only when the beam of emission is pointing toward Earth (much the way a lighthouse can be seen only when the light is pointed in the direction of an observer), and is responsible for the pulsed appearance of emission. Neutron stars are very dense, and have short, regular rotational periods. This produces a very precise interval between pulses that range from milliseconds to seconds for an individual pulsar.” (“Pulsar;” https://en.wikipedia.org/wiki/Pulsar)

These objections to this explanation stem from the following considerations (Scott, “The Invention of the Neutron Star,” 2016; https://www.thunderbolts.info/wp/2016/02/29/the-invention-of-the-neutron-star-space-news/):

- “How rapidly the star has to be rotating to produce these flashes in millisecond time”
- “That the earth, where we do all our observing from, must be exactly in the beam’s plane of rotation.”

EUT objections to the first phenomenon stem from considerations such as follows. When discovered in 2000, the Vela pulsar was anointed to be a neutron star about 12 (now 18) miles in diameter spinning 10 times per second (600 rpm). Envision a star, more massive than the sun, spinning so rapidly, yet not flying apart. To explain this, astronomers conjured *ad hoc* the concept of a star so dense that it is composed solely of neutrons packed as dense as an atomic nucleus. This ignores that neutrons do not remain in compact bunches, i.e., a lone neutron decays into a proton, electron and neutrino in about 14 min – they are unstable. Therefore, atom-like collections of two or more should fly apart quite rapidly.

Even more damning was the discovery of an X-ray pulsar in Sagittarius with a flashing period of 0.0025 sec, i.e., a rotation rate of 24,000 rpm, roughly the speed of a dental drill. To cover this finding, an even more *ad hoc* explanation was conjured, namely that this pulsar consisted of matter even denser than neutronium – “strange” matter (perhaps a “quark” star). Further complicating the pulsar theory was the observed varying periodicity of the Vela pulsar, namely that it regularly speeds up roughly every three years while experiencing “micro-glitches,” i.e., random changes in rotation speed. Furthermore, the pulse width also changes with time, sometimes sharply. This troubles astronomers because it implies that these very massive, unbelievably rapidly rotating stars must instantaneously vary their rotation rates by possibly thousands of rpm.

In this exercise, we do not examine this first set of objections (although recognizing that EUT has offered answers consistent with its postulate that pulsars are really “strobe” stars, discussed below). Rather, the focus is on the second set, namely the mathematical inconsistencies associated with pulsar beams having to align so as to be detected by the earth.

2. Geometrical/Mathematical Incredulity?

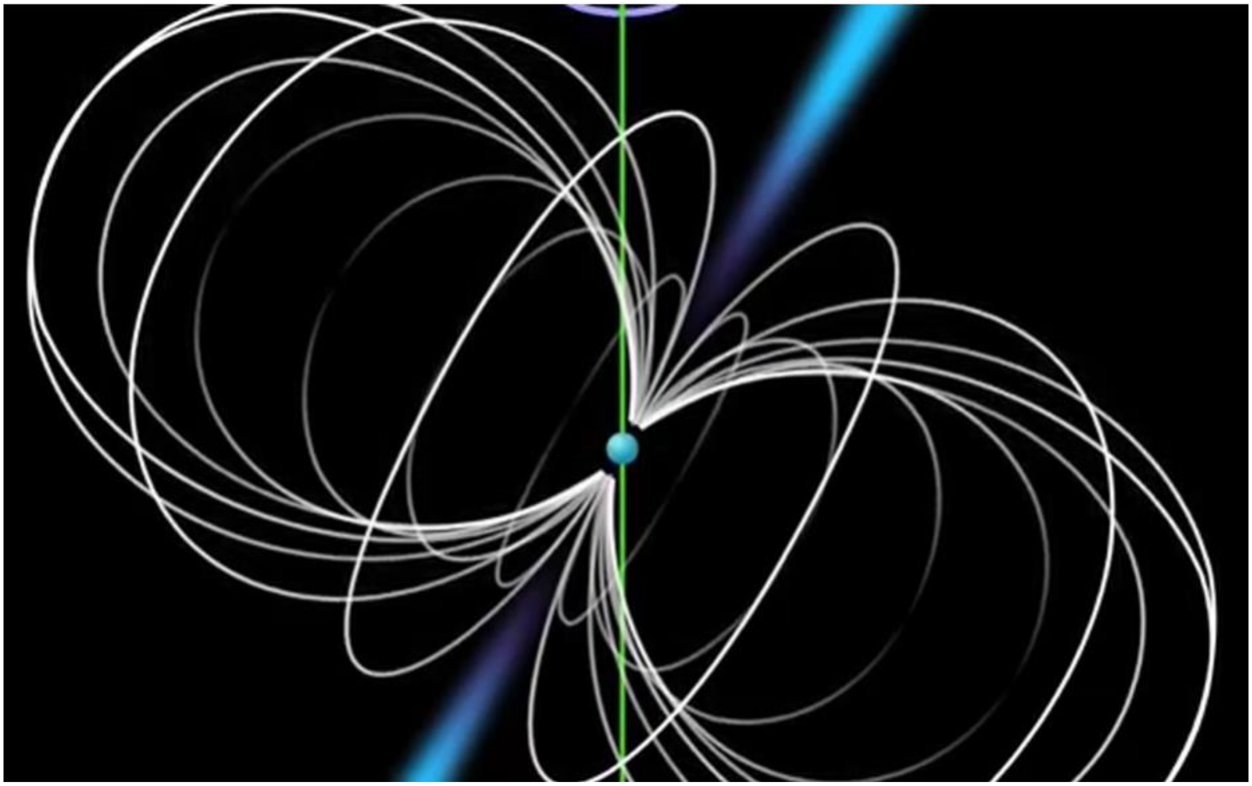


FIGURE 1. Contemporary View of Pulsar as Rotating Neutron Star Emitting Electromagnetic Beams Axially

Repeating Dr. Scott's observations, "…the [neutron] stars are thought to be emitting a narrow beam of light and rapidly rotating … [T]he earth, where we all do our observing from, must be exactly in the beam's plane of rotation … So it's got to be very precisely in alignment … [I]s that probable?" (Scott, "The Invention of the Neutron Star," 2016; https://www.thunderbolts.info/wp/2016/02/29/the-invention-of-the-neutron-star-space-news/)

"There are different models for estimating the number of stars in the Milky Way and the answers they give differ depending on what is used as the average mass of a star. The most common answer seems to be that there are 100 billion stars in the Milky Way on the low-end and 400 billion on the high end." (Large, "The Galactic Population of Pulsars," 1971; https://asd.gsfc.nasa.gov/blueshift/index.php/ 2015/07/22/how-many-stars-in-the-milky-way/)

"An estimate of the total number of pulsars in the Galaxy with a peak luminosity ≥ 1 fu(dm)^2 gives 5 × 10^5 within a factor of 10." (http://link.springer.com/chapter/10.1007/978-94-010-3087-8_26) "The space density and total number of observable pulsars in the Galaxy have previously been estimated by several authors. Large (1971) obtained a value of $N_G = 5 \times 10^5$ based on a mean electron density of 0.05 cm^{-3}. For $\langle n_e \rangle = 0.03$ cm^{-3}, this value would be reduced to about 2 x 10^5, in good agreement with the value of 1.3 x 10^5 obtained above." (Taylor and Manchester, "Galactic Distribution and Evolution of Pulsars," *The Astrophysical Journal*, **215**:885-896, August 1, 1977; http://articles.adsabs.harvard.edu/cgi-bin/nph-iarticle_query?bibcode=1977ApJ...215..885T&db_key=AST&page_ind=8&data_type=GIF&type=SCREEN_VIEW&classic=YES) "… [B]y the time of writing (Nov 2003) about 1700 pulsars were known." (http://www.jb.man.ac.uk/distance/frontiers/pulsars/section6.html). Figure 2 shows the accumulation of pulsar observations over the past 40 years.

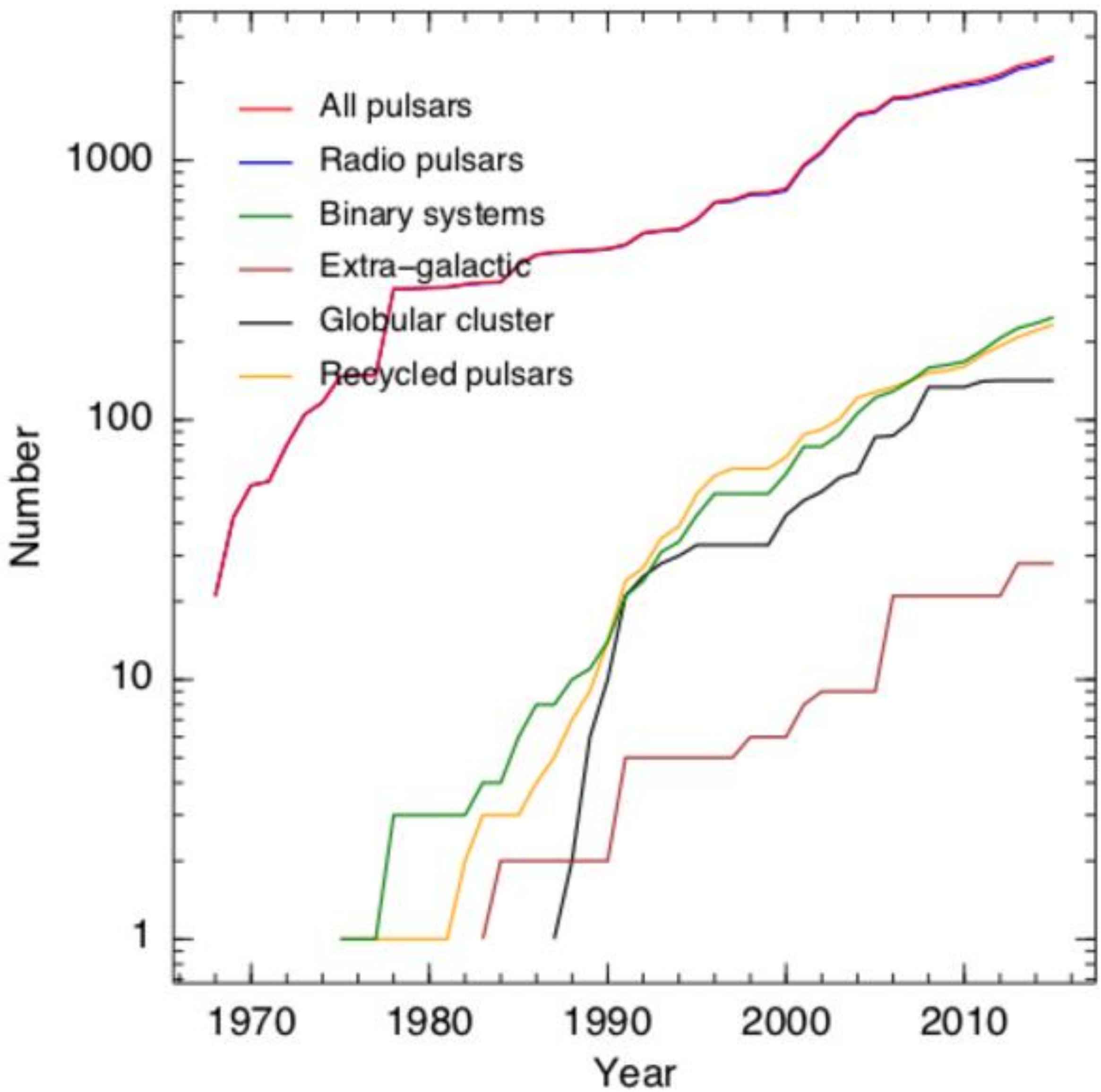


FIGURE 2. The cumulative number of pulsars known (and the number of different types of pulsars) (https://en.wikibooks.org/wiki/Pulsars_and_neutron_stars/History_of_pulsar_discoveries [2016])

From the above sources, it seems clear that, at present, only a small fraction (~2000/[1 to 5 x 10^5] ≈ 0.02 to 0.004) of the estimated number of pulsars within our galaxy has been identified. However, let us assume that ALL the stars in our galaxy were pulsars, i.e., 4 x 10^{11}, each an average distance of 10 light-years from earth. The first quote from Dr. Scott asks if it is probable that the narrow beam of light from a rotating pulsar would be precisely aligned such that it could be detected from earth. Earth has a diameter of ~13,000 km. If, on average, a pulsar is 10 l-y distant (~1 x 10^{13} km), the earth would subtend an angle of 13000/(1 x 10^{13}) = 1.3 x 10^{-10} radian relative to the pulsar. This is 1.3 x $10^{10}/\pi$ ≈ 4 x 10^{-11} of the possible alignments between the earth and pulsar. Given 4 x 10^{11} potential pulsars in the galaxy, we would expect to see only (4 x 10^{-11})(4 x 10^{11}) = 16 pulsars from the earth. However, over 100 times that number have been observed to date. The number would drop to zero if we used the estimated number of neutron stars within the galaxy, i.e., (4 x 10^{-11})(5 x 10^5) = 2 x 10^{-5} ≈ 0. Therefore, to have observed the roughly 2000 alleged pulsars to date, there would have to be some phenomenon within the galaxy to so align the narrow beams such that they would be at least $(2000)/(2 \times 10^{-5}) = 1 \times 10^{8}$ times more likely to intersect the earth's line of sight. This stretches any amount of credulity.

3. Plausibility of "Strobe" Stars?

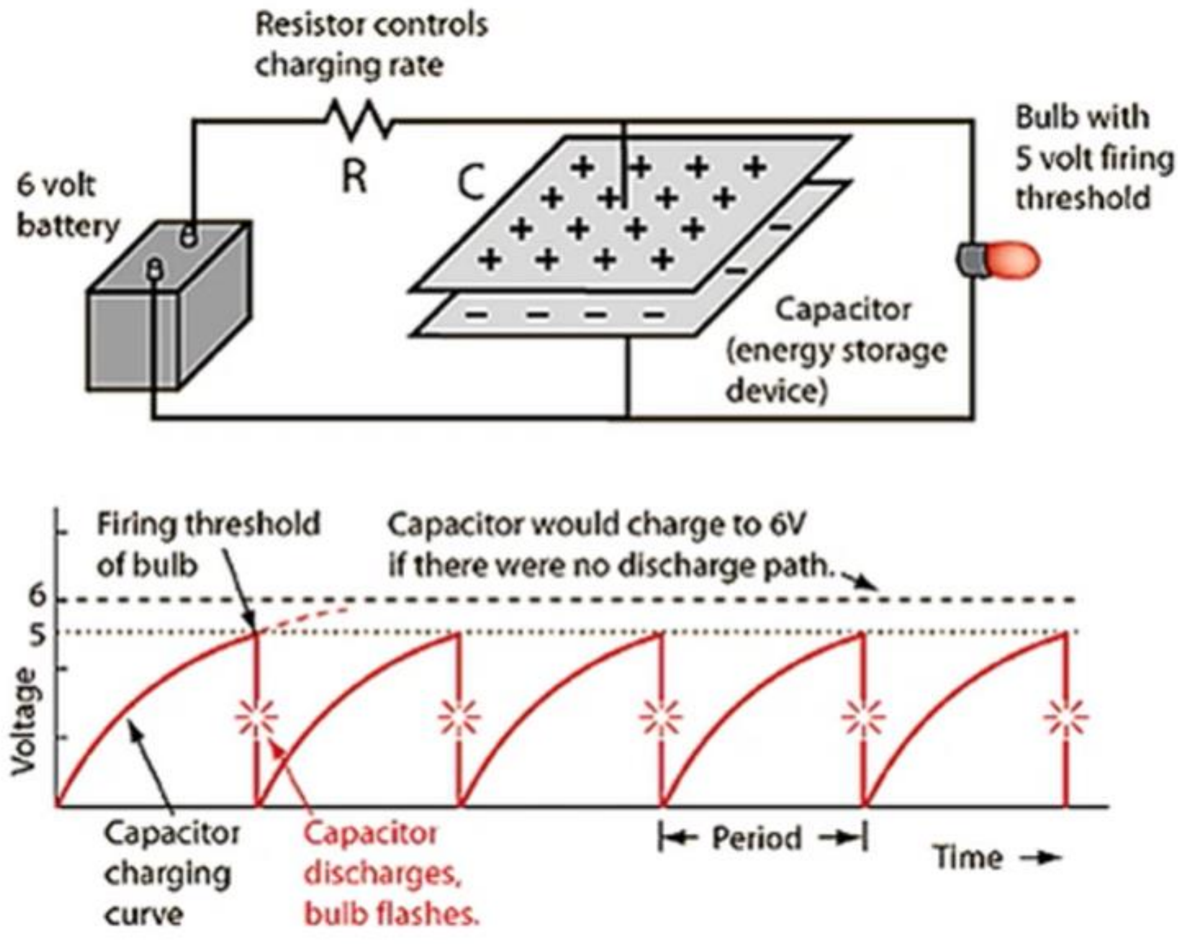


FIGURE 3. Circuit Schematic for a Strobe Device

"What we're looking at in pulsars are strobe lights [see Figure 3]… At the heart of the strobe light is just a small bulb containing a plasma driven by a very simple electrical circuit … [I]n space it doesn't need a glass tube; it can just be a cloud of plasma. And it can put out pulses of light at various periodicities and pulse widths … So, if we have a … binary pair of stars out in space, and if they are closely spaced, there may very well be a plasma bridge [see Figure 4] between them and the resistance … is the resistance of that plasma bridge. And so, the capacitance value depends on the surface area of the two stars, and if one of the stars is being driven by an external current to higher and higher voltage, clearly this kind of [strobe] oscillation is possible …" (Scott, "The Invention of the Neutron Star," 2016; https://www.thunderbolts.info/wp/2016/02/29/ the-invention-of-the-neutron-star-space-news/)

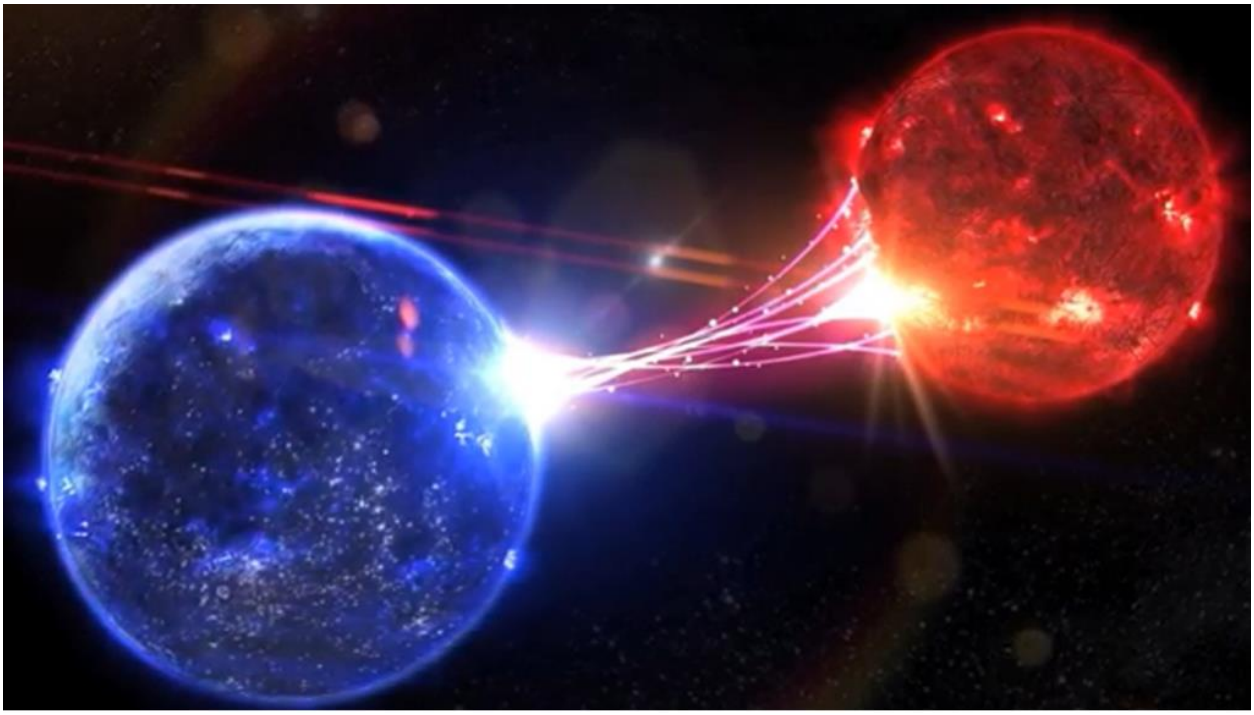


FIGURE 4. “Pulsar” Concept Based on EUT Theory of Binary Stars Connected by Plasma Bridge

“In 1995, an analysis was performed by Peratt and Healy on a transmission line system having the properties that they believed to be those of a pulsar atmosphere … [T]hey could explain in those experiments 17 different observed properties of pulsar emissions … [T]hey could imitate glitches, … varying pulses, …change the width of the pulse itself; all sorts of things were possible. And it can happen very, very quickly … and probably does indeed happen in space.” (Scott, “The Invention of the Neutron Star,” 2016; https://www.thunderbolts.info/wp/2016/02/29/ the-invention-of-the-neutron-star-space-news/) In “Radiation Properties of Pulsar Magnetospheres: Observation, Theory and Experiment” (*Astrophysics and Space Science*, **227**:229-253 [1995]), Healy and Peratt concluded the following:

> “The simulated model [of a pulsar’s magnetosphere transmission line] produced a train of $10^{13\text{-}16}$ ampere pulses with periodicity 0.65 s. These $\gamma \sim 10^{7\text{-}10}$ currents are thought to be the source of the synchrotron radiation observed. The polarization properties of the model are consistent with observation … This is consistent with (Rankin) S_d class pulsars … The simulation results were verified with a high-voltage, transmission line experiment … [which] showed that glitches, the flow of electron flux across the magnetosphere, can shorten the line and concomitantly the period. Both simulation and experiment suggest that micro-pulses and sub-pulses are produced [by] particle-wave interactions in non-uniform plasma irradiated by an electromagnetic wave ... when the magnetically insulated voltage pulse reaches the pulsar surface. Because of the curvature, … plasma flows across this region … to produce a resonating or modulation component on the proper current pulse … [T[he source of the radiation energy may not be contained within the pulsar, but may instead derive from either the pulsar’s interaction with its environment or by energy delivered by an external circuit [my emphasis] … [O]ur results support the ‘planetary magnetosphere’ view where the extent of the magnetosphere, not the emission points on a rotating surface, determines the pulsar emission.”

Healy’s and Peratt’s work supports the concept that pulsars are not only driven by an external “circuit” (Birkeland current?) but also that, rather than being steady-state radiation beams from the poles of an unbelievable rapidly rotating star of immense density, they are akin to a strobe effect with reproducible periodicity, but susceptible to small changes, observed as “glitches.”

"More than four-fifths of the single points of light we observe in the night sky are actually two or more stars orbiting together. The most common of the multiple star systems are binary stars, systems of only two stars together." ("Binary Star Systems: Classification and Evolution," August 23, 2013; http://www.space.com/22509-binary-stars.html) "In fact, 85% of the stars in the Milky Way galaxy are not single stars, like the Sun, but multiple star systems, binaries or triplets." (Schneider and Arny, "Binary Stars;" http://abyss.uoregon.edu/~js/ast122/lectures/lec10.html)

Based on these estimates, we conservatively assume 3/4 of the galaxy's stars are binary, i.e., $(3/4)(4 \times 10^{11}) = 3 \times 10^{11}$, which theoretically would comprise $(3 \times 10^{11})/2 = 1.5 \times 10^{11}$ binary "pulsar" sources (which we will round down to 1×10^{11}, at least partially accounting for triplets, etc.). To date, approximately 2000 pulsars have been identified, which would be $(2000)/(1 \times 10^{11}) = 2 \times 10^{-8}$ of all potential sources. However, of these potential sources, they must first be close enough to form a plasma bridge, then such a bridge must actually exist. From the earlier estimates, $(5 \times 10^{5})/(4 \times 10^{11}) \approx 1 \times 10^{-6}$ of the stars in our galaxy might be pulsars. This would raise the fraction of pulsars already identified from the microscopic 2×10^{-8} to a more reasonable $(2 \times 10^{-8})/(1 \times 10^{-6}) = 0.02$. Therefore, it does not stretch credulity to suppose that 2% of the potential pulsar sources in our galaxy have been identified to date, at least nowhere near as much as believing that the probability of pulsar alignment, such that their beams could be detected by earth, is 1×10^{8} times more likely than would be estimated from simple geometry.

4. Conclusion

EUT offers serious objections to the current concept of pulsars (neutron stars) as almost unbelievably dense, very small diameter, possibly incredibly rapidly rotating, collapsed star cores with densities comparable to an atomic nucleus, composed entirely of neutronium. Objections are both physical, phenomenological and geometrical/mathematical. This paper examined the geometrical/mathematical objections to show that this current concept stretches credulity to "astronomical" levels, i.e., essentially an impossibility, while the EUT conjecture that these are really binary "strobe" stars, in addition to satisfying both physical and phenomenological aspects, also makes geometrical/mathematical sense, certainly within reasonable levels of credulity.

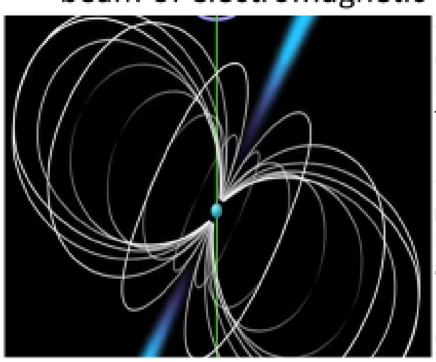
"NEUTRON" VS. "STROBE" STARS?

Examining Their Geometrical/Mathematical Plausibility in Light of Electric Universe Theory

Dr. Raymond HV Gallucci, P.E.

BACKGROUND - PULSARS

- Electric Universe Theory (EUT) questions the current explanation for a pulsar as "a highly magnetized, rotating neutron star that emits a beam of electromagnetic radiation."



"... Observed only when the beam ... is pointing toward Earth (much the way a lighthouse can be seen only when the light is pointed in the direction of an observer), and is responsible for the pulsed appearance of emission."

"Neutron stars are very dense, and have short, regular rotational periods. This produces a very precise interval between pulses that range from milliseconds to seconds for an individual pulsar."

("Pulsar;" https://en.wikipedia.org/wiki/Pulsar)

ELECTRIC UNIVERSE OBJECTIONS

- These objections stem from the following considerations (Scott, "The Invention of the Neutron Star," 2016; https://www.thunderbolts.info/ wp/2016/02/29/the-invention-of-the-neutron-star-space-news/):
  - "How rapidly the star has to be rotating to produce these flashes in millisecond time."
  - "That the earth, where we do all our observing from, must be exactly in the beam's plane of rotation."

FIRST OBJECTION

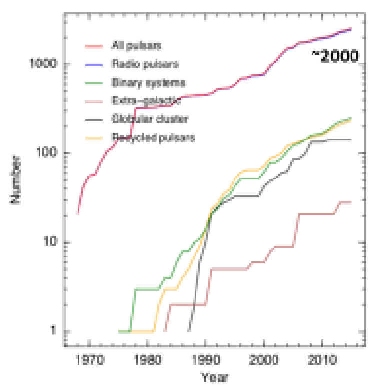
- Envision a star, more massive than the sun, spinning so rapidly, yet not flying apart.
  - Astronomers conjured *ad hoc* the concept of a star so dense that it is composed solely of neutrons packed as dense as an atomic nucleus.
    - However, a lone neutron decays into a proton, electron and neutrino in about 14 min – atom-like collections of two or more should fly apart quite rapidly.
  - Even more damning was the discovery of an X-ray pulsar in Sagittarius with a period of 0.0025 sec (i.e., rotating at 24,000 rpm, ~ speed of a dental drill).
    - An even more *ad hoc* explanation was conjured - this pulsar consisted of matter even denser than neutronium – "strange" matter (perhaps a "quark" star).

FIRST OBJECTION (cont.)

- Envision a star, more massive than the sun, spinning so rapidly, yet not flying apart …
  - Further complicating the pulsar theory was the observed varying periodicity of the Vela pulsar:
    - It regularly speeds up roughly every three years while experiencing "micro-glitches," i.e., random changes in rotation speed. Furthermore, the pulse width also changes with time, sometimes sharply.
    - This implies that these very massive, unbelievably rapidly rotating stars must instantaneously vary their rates by thousands of rpm.
- We do not examine this first objection (although recognizing that EUT has postulated that pulsars are really "strobe" stars). Rather, <u>the focus is on the second objection - the mathematical inconsistencies associated with pulsar beams having to align so as to be detected by the earth</u>.

GEOMETRICAL/MATHEMATICAL INCREDULITY?

- Rough estimates of the number of stars in the Milky Way galaxy range from 100 to 400 billion (Large, "The Galactic Population of Pulsars," 1971; https://asd.gsfc.nasa.gov/blueshift/index.php/2015/07/22/how-many-stars-in-the-milky-way/).
- Similar estimates for the number of pulsars range from ~1 to 5 x 10^5 (Large [1971]; Taylor and Manchester, "Galactic Distribution and Evolution of Pulsars," *The Astrophysical Journal*, **215**:885-896, August 1, 1977; http://articles.adsabs.harvard.edu/cgi-bin/nph-iarticle_query?bibcode=1977ApJ...215..885T&db_key=AST&page_ind=8&data_type=GIF &type= SCREEN_VIEW&classic=YES).



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"… [B]y the time of writing (Nov 2003) about 1700 pulsars were known." (http://www.jb.man.ac.uk/distance/frontiers/ pulsars/section6.html).

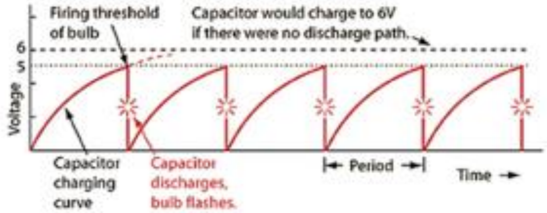
GEO/MATH INCREDULITY? (cont.)

- At present, only a small fraction (~2000/[1 to 5 x 10^5] ≈ 0.02 to 0.004) of the estimated number of pulsars has been identified.
- As an extreme, assume ALL 4 x 10^{11} stars in our galaxy are pulsars, each an average distance of 10 light-years from earth. Dr. Scott asks if it is probable that the narrow beam of light from a rotating pulsar would be precisely aligned such that it could be detected from earth.
  - Earth has a diameter of ~13,000 km. At 10 l-y distant (~1 x 10^{13} km), the earth would subtend an angle of 13000/(1 x 10^{13}) = 1.3 x 10^{-10} radian relative to the pulsar. This is 1.3 x $10^{10}/\pi$ ≈ 4 x 10^{-11} of the possible alignments between the earth and pulsar.

GEO/MATH INCREDULITY? (cont.)

- Given 4 x 10^{11} potential pulsars in the galaxy, we would expect to see only (4 x 10^{-11})(4 x 10^{11}) = 16 pulsars from the earth. However, over 100 times that number have been observed to date.
  - If we used the estimated number of neutron stars within the galaxy, i.e., (4 x 10^{-11})(5 x 10^5) = 2 x 10^{-5} ≈ 0, to have observed the roughly 2000 alleged pulsars to date, there would have to be some phenomenon within the galaxy to so align the narrow beams such that they would be at least (2000)/(2 x 10^{-5}) = 1 x 10^8 times more likely to intersect the earth's line of sight. This stretches any amount of credulity.

"STROBE" STARS?



"What we're looking at in pulsars are strobe lights … [a]t the heart of [which] is just a small bulb containing a plasma driven by a very simple electrical circuit … [I]n space … it can just be a cloud of plasma. And it can put out pulses of light at various periodicities and pulse widths … So, if we have a … binary pair of stars out in space, and if they are closely spaced, there may very well be a plasma bridge between them and … if one of the stars is being driven by an external current to higher and higher voltage, clearly this kind of [strobe] oscillation is possible …" (Scott, "The Invention of the Neutron Star," 2016; https://www.thunderbolts.info/wp/2016/02/29/the-invention-of-the-neutron-star-space-news/)

"STROBE" STARS? (cont.)

- "In 1995, an analysis … by Peratt and Healy on a transmission line system having the properties … believed to be those of a pulsar atmosphere … could explain … 17 different observed properties of pulsar emissions …" (Scott, "The Invention of the Neutron Star," 2016; https://www.thunderbolts.info/wp/2016/02/29/the-invention-of-the-neutron-star-space-news/)
  - In "Radiation Properties of Pulsar Magnetospheres: Observation, Theory and Experiment," they concluded (*Astrophysics and Space Science*, **227**:229-253 [1995]):
    - "Because of the [pulsar's] curvature, … plasma flows … to produce a resonating or modulation component … [T[he source of the radiation energy may … derive from either the pulsar's interaction with its environment or by energy delivered by an external circuit … [O]ur results support the 'planetary magnetosphere' view where the extent of the magnetosphere, not the emission points on a rotating surface, determines the pulsar emission."

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- "More than four-fifths of the single points of light we observe … are actually two or more stars orbiting together. The most common … are binary stars, systems of only two stars together." ("Binary Star Systems: Classification and Evolution," August 23, 2013; http://www.space.com/22509-binary-stars.html)
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"STROBE" STARS? (cont.)

- Conservatively assume 3/4 of the galaxy's stars are binary (3×10^{11}), which theoretically would comprise 1.5×10^{11} binary "pulsar" sources (rounded down to 1×10^{11}, at least partially accounting for triplets, etc.).
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CONCLUSION

- EUT offers serious objections to the current concept of pulsars (neutron stars) as almost unbelievably dense, very small diameter, possibly incredibly rapidly rotating, collapsed star cores with densities comparable to an atomic nucleus, composed entirely of neutronium.
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