



LPPFusion Report *January 14, 2020*

Summary:

- **Wefunder Campaign Enters Home Stretch**
- **Light Elements Weigh in on Crisis in Cosmology**
- **Song Contest Winners!**
- **Fred Van Roessel 1937-2019**

Note: This report is on LPPFusion developments outside our lab work. A separate report on lab development will follow next week.

Wefunder Campaign Enters Home Stretch

As we have reported to all investors and supporters, LPPFusion is again crowdfunding on the [Wefunder website](#). Through the Wefunder site, anyone can now buy LPPFusion shares. We started this second campaign on Nov. 15, 2019 and now we are in the **last two weeks**, with the campaign ending Jan. 31, 2020. So far, we've raised \$336,000 from 133 investors. We need to raise \$64,000 more to reach our minimum goal of \$400,000. We're confident we can do that with the help of new and old investors.

This is your chance to help decide if and when fusion energy becomes reality. Humanity needs fusion to move forward. So far, LPPFusion has made the most progress towards achieving net energy for the least resources. With only \$7 million invested, we have published peer-reviewed results [thousands of times better than any other private fusion company](#). Our ratio of energy out to energy in is only 1/3 less than that achieved by JET, the most successful government fusion program—and they got that record back in 1997.

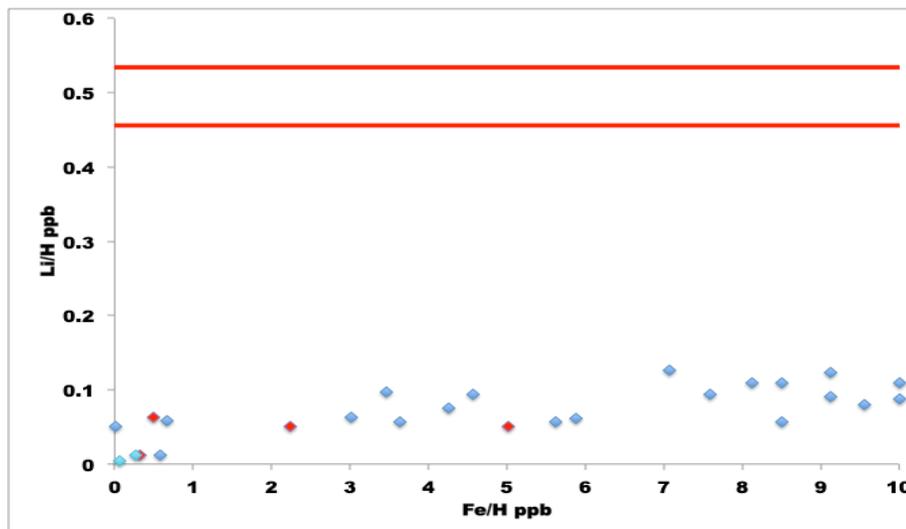
Your investment, a minimum of \$1,000 for 8 shares, will make more of a difference with LPPFusion than with any other fusion project. Our company valuation right now is only \$38 million, so you will get the best bargain in fusion. For non-accredited investors, the Wefunder campaign is at present the only way to invest in LPPFusion.

We realize that not everyone who wants to support our fusion effort can afford a \$1,000 investment. For those who want to contribute, we will be initiating a major donation drive, with no minimum contribution, in February. We'll be announcing the details shortly. Our goal remains to raise \$1 million from all sources as soon as possible.

Light Elements Weigh in on Crisis in Cosmology

A bedrock prediction of the Big Bang theory has been contradicted by abundant observations, according to a new study by LPPFusion's Chief Scientist Eric Lerner which he [presented](#) Jan. 8 at the American Astronomical Society Meeting in Honolulu, deepening the already widely-discussed crisis in cosmology. The study looks at the origin and abundance of three key light elements that are hypothesized to have been created by the Big Bang. Precise amounts of helium, deuterium and lithium are predicted to have been formed by fusion reactions in the dense, extremely hot initial instants of the Big Bang.

For both lithium and helium, the study shows, observations of abundances in old stars now differ from predictions by more than a dozen standard deviations and the gap has been widening at an accelerating pace. The oldest stars have less than half the helium and less than one tenth the lithium than that predicted by Big Bang Nucleosynthesis theory. The lowest lithium levels observed are less than 1% that predicted by the theory. Indeed, the evidence is consistent with **no** helium or lithium having been formed before the first stars in our galaxy.



Li vs Fe abundance for the 26 known dwarf stars with Fe/H < 10 ppb. These are the oldest stars, with the least contamination from earlier stars. Dark blue dots are measured values, red dots are Li upper limits and light blue dots are Li and Fe upper limits. The BBN predicted range of values is shown by the red solid lines.

Equally important, the study shows that the right amounts of these light elements have been predicted by an alternative explanation, which hypothesizes that these elements were produced by stars in the earliest stages of the evolution of galaxies. This alternative explanation, which Lerner calls the Galactic Origin of Light Elements or GOLE hypothesis, derives from theoretical expectations that the first generation of stars to form in a galaxy are intermediate-mass stars that are from 4 to 12 times as massive as the sun. These stars burn hydrogen to helium in tens to a couple of hundred million years, much faster than our sun's burn rate of ten billion years. The helium then disperses in powerful stellar winds during the late stages of these stars' lifetimes. Cosmic rays from these early stars, colliding at high energy with other nuclei, produce deuterium and lithium.

Lerner's new work was covered in a number of news reports including the online magazine [Inverse](#), [Futurism](#), [Courthouse News Service](#), and [Space Daily](#).

The science website "See the Pattern" posted Dec. 21 a [new hour-long illustrated interview](#) with Lerner discussing the relationship between the companies' fusion research efforts and his research in cosmology. The physical theories that guide the development of the plasma focus device for fusion experiments arose from studies by Lerner and others of quasars, the giant explosions deep in space. The tiny plasmoids in the device, where the fusion reactions

take place, are in essence ultra-scaled-down versions of quasars. So, instead of a “star in a bottle” our fusion device is more a “quasar in a bottle”.

Lerner’s research in fusion and in cosmology have been closely linked for decades. In addition to the quasar work, Lerner performed calculations about the [origin of the large-scale structure of the universe](#), based on the properties of plasma filamentation—an instability that generates tornadoes of electric current and magnetic fields on all scales. On the cosmology side, these calculations, together with observations of giant superclusters of galaxies, showed that the **largest structures must have taken hundreds of billions of years to form, far longer than the time available since the hypothetical Big Bang**, so this was strong evidence against the Big Bang theory. On the fusion side, quantitative understanding of these filaments, which form on a tiny scale in the plasma focus device, allowed solid predictions of how the device would work best.

Many of the conflicts between Big Bang theory and observations that are emphasized in the new study have been known for some time, especially the “lithium problem”. But most cosmologists have dismissed them as “anomalies” in an otherwise sound Big Bang “concordance cosmology” theory. On the contrary, Lerner contends that the light elements results join the better-known Hubble-constant and closed-universe problems in a long list of **contradictions between Big Bang theory and observations**. “The Big Bang should have resulted in the annihilation of matter and antimatter, leaving a surviving density of matter that would be a hundred billion times less than that observed,” Lerner points out. “To avoid that outcome, **Big Bang theory requires an asymmetry of matter and antimatter with consequences, such as the decay of the proton, which have been contradicted by extensive experiments**. In addition, an expanding universe should lead to declines in the surface brightness of distant galaxies—but those have not been observed either, as I and my colleagues have shown in [published papers](#). The list of contradictions goes on and on. **For cosmology to advance, the basic hypothesis of the Big Bang has to be abandoned. The real crisis in cosmology is that the Big Bang never happened.**”

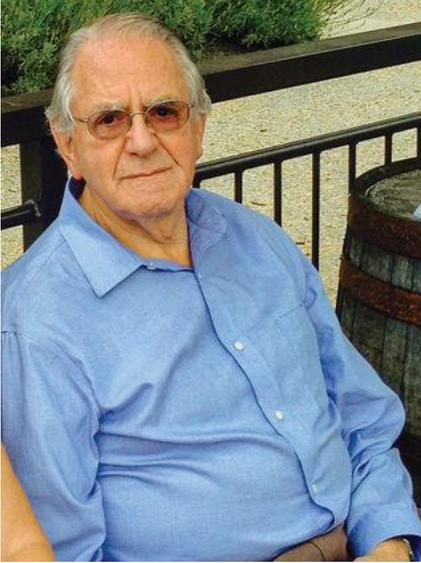
Technical background on the new study and on the other problems with Big Bang theory is available [here](#).

Fusion Song Winners!

The votes, all 63 of them, are in and we have our winners in our Fusion Song Parody contest. First Prize, with 24 votes to “Fusion for Everyone” written by 2-time contest winner and still champion, Gregory N. Ranky! Second Prize, with 16 votes, to “Age of Beryllium” written by Chief Scientist Eric Lerner. Third Prize, with 9 votes, to “Cone with US” by Matei Victor. Rest of the votes, 14 total, to the other contestants: “Plasmoid Song” and “Focus Fusion Anthem” by Lerner and “FoFu, FoFu” by Mike Muller. Congratulations to all!

Next step: Can anyone who sings well and someone who plays an instrument get together and record one of the winners in a video? Might be fun and get us a bit of notice!

Fred Van Roessel 1937-2019



We have the sad duty to report that our friend, colleague and team member Fred Van Roessel has died. He suffered a fatal stroke on Tuesday, November 26 and died without regaining consciousness on November 28. Fred was LPPFusion's Electrical Engineer.

Fred came to work with LPPFusion in 2010, only six months after our FF-1 device started operating at our lab in Middlesex, NJ. He started working part-time in our lab after his retirement from Phillips Research Lab and Panasonics. He was a core member of our team, making large contributions with his expertise in electrical engineering, optics and software development. He made our ICCD camera operational, obtaining our first images of the plasmoids where fusion reactions take place. He redesigned and re-made the trigger heads that allow our switches to fire. He helped diagnose and fix many early problems with the operations of the switches. In 2014, he designed and developed JavaFusion, a program that analyzes our data, identifying and measuring the peaks that show the results of each shot.

After Fred relocated to North Carolina in 2015, he continued to work with us remotely, consulting on our work and continuing to make great improvements in JavaFusion to meet our evolving needs. Indeed, he sent us an email about his ideas for further upgrades on the day before his stroke.

Prior to working with us, Fred had spent a career as a pioneer of color TV cameras. He was born Frederick J. Van Roessel in the Netherlands in 1937 and started his engineering work at the Television Group at Phillips. He later emigrated to the US, still working for Phillips. He developed the software and hardware for fully automating camera adjustments. For these and other advances, he was awarded 17 patents. He was a Fellow of the Society of Motion Picture and Television Engineers, among other honors.

Fred was an extraordinary engineer—extremely careful and accurate, knowledgeable and insightful. While firm in expressing his professional opinions, he was never argumentative. He always maintained a quiet, friendly calmness and equilibrium, even at the times when his own life was going through a rough patch. He took great joy in working on and solving the puzzles that our project threw up to him. He was truly a pleasure to work with and to know.

His death came as a shock. To all who knew him, he appeared to be in good health right up to the end. He was a great guy and will be deeply missed.