

Focus Fusion   Eco Safe \* Green \* Clean \* Virtually Unlimited \* Cheap



Lawrenceville Plasma Physics, Inc  
High technology research, development and consulting in plasma physics, X-ray sources, and Focus Fusion

## *LPPFusion Report* *March 29, 2018*

### Summary:

- **LPPFusion Chief Scientist Publishes Evidence Against Cosmic Expansion in Leading Journal**
- **Wefunder Equity Crowdfunding Enters Last Month**
- **Fusion Industry Alliance Formed**
- **Thermal Study of Electrodes Begins**

# LPPFusion Chief Scientist Publishes Evidence Against Cosmic Expansion in Leading Journal

The hypothesis that the universe is expanding is a basic pillar of the Big Bang theory. But observations of the size and brightness of thousands of galaxies contradict predictions based on the Big Bang expansion hypothesis, thus shaking this key pillar, according to a [new paper](#) published in the leading astrophysical journal *Monthly Notices of the Royal Astronomical Society*, a publication of Oxford University Press. The new study by LPPFusion Chief Scientist Eric Lerner, titled “Observations contradict galaxy size and surface brightness predictions that are based on the expanding universe hypothesis”, finds that none of the published expanding-universe predictions of galaxy-size growth fit the actual data. All of the proposed physical mechanisms for galaxy growth, such as galaxy mergers, also contradict observations. However, the paper finds that the data are closely fit by the contrary hypothesis that the universe is *not* expanding, and that the redshift of light is caused by some other, currently unknown, process.

This new paper, and the prominence of the journal it is published in, is causing a considerable stir among cosmologists. The paper has already moved onto the journal’s “Most Read” list, based on views and downloads over the past 30 days. “We’re hoping that there will be substantial press coverage of this paper,” says Lerner, “which, of course, we hope will also lead to more attention to our fusion work.” LPPFusion’s work is guided by quantitative theories that Lerner developed in his research in astrophysics, specifically to explain quasars. The plasma phenomena needed to understand how to get a working fusion generator are the same phenomena needed to understand how structures such as galaxies have formed in the universe. So, studying some of the largest and remotest phenomena in the universe contributes directly to solving practical problems in fusion.

The new research tests a striking 1930s prediction of Big Bang hypothesis that objects at great distances should actually appear larger, not smaller. According to the hypothesis, this is because of an optical illusion due to the galaxies having been much closer when their light was emitted.

This prediction was repeated in the literature through the 1980s but in the 1990s, the Hubble Space Telescope did not confirm the prediction. Hubble’s images instead showed that the most distant galaxies do in fact look the smallest. A group of researchers then formulated an additional hypothesis that galaxies actually grow in size with

time. So very distant galaxies, viewed as they were billions of years ago, were theorized to have been much smaller than present-day ones. In this way, the smaller intrinsic galaxy sizes of the 1990s galaxy-growth theory neatly cancelled out the 1930s optical illusion prediction.

In Lerner's new paper the quantitative, published, predictions of the galaxy-growth theories were tested against the observed sizes of thousands of both spiral and elliptical galaxies, using HST observations from the period 2004-2014. The paper limited the samples to galaxies that have close to the same UV brightness. (Brighter galaxies are larger.) The observed data did not come close to fitting the predictions that galaxy size grows in proportion to the rate of expansion of the universe (Figure 1).

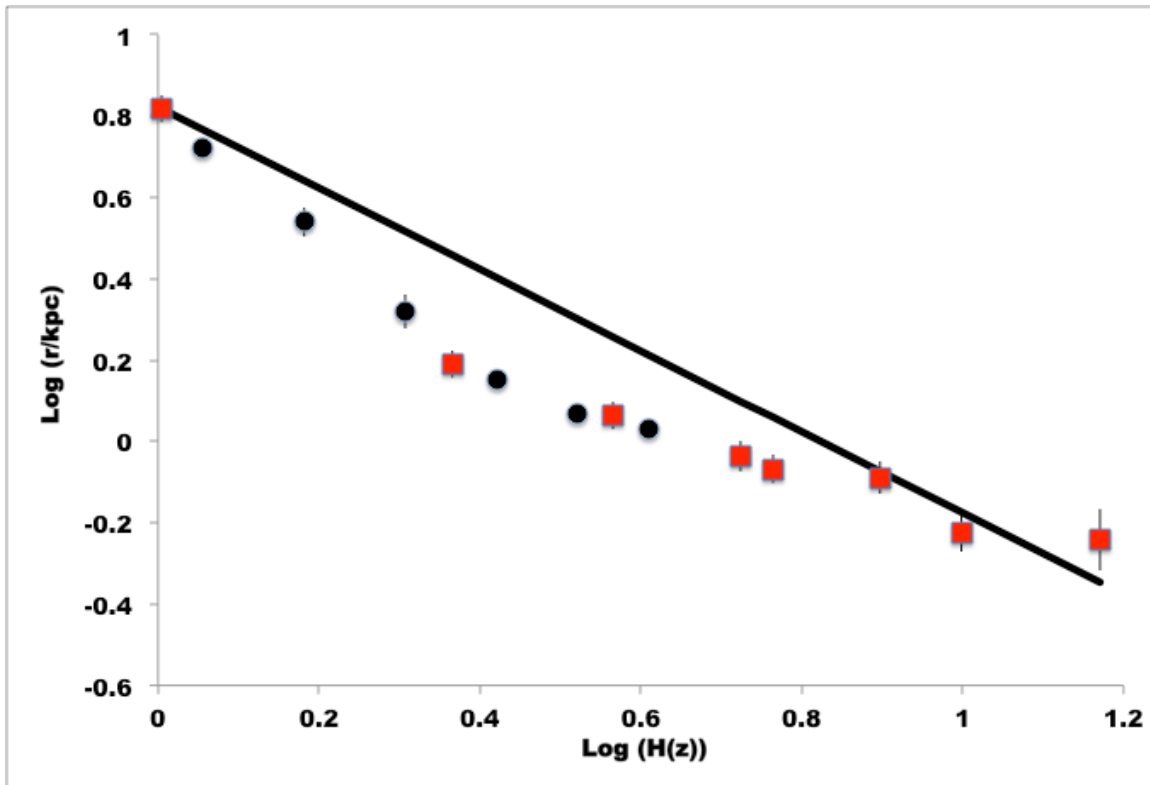


Figure 1. Log of the median radius of galaxies (in kiloparsec where 1 kiloparsec is 3,260 light-years), calculated with the expanding universe formula, are plotted here against the  $\log(H(z))$ , a measure of hypothesized cosmological expansion, a function of the red shift  $z$ . Red squares are samples of spiral galaxies, black circles are samples of elliptical galaxies. The black straight line is the closest prediction of galaxy size based on cosmological expansion and the hypothesized galaxy growth. It does not fit the data.

In addition, Lerner pointed out that the process hypothesized for the growth of elliptical galaxies—mergers with other galaxies—occurs at a rate nearly ten times too slow for the growth hypothesized. A still worse contradiction with observation is obtained by comparing the gravitating mass of distant galaxies, (calculated from rotational speed and size), with the mass of the stars in them, (calculated from their emitted light). The size predictions based on the expanding universe lead to a gravitating mass smaller than the mass of the stars, an obvious impossibility.

While the expanding universe predictions did not fit the data, Lerner found that predictions based on a non-expanding universe fit both the spiral and elliptical galaxies at all distances to an accuracy of a few percent. No matter what the distance, with a non-expanding universe, the galaxies of a given brightness were the same size, just as predicted by the non-expanding hypothesis. (Figure 2).

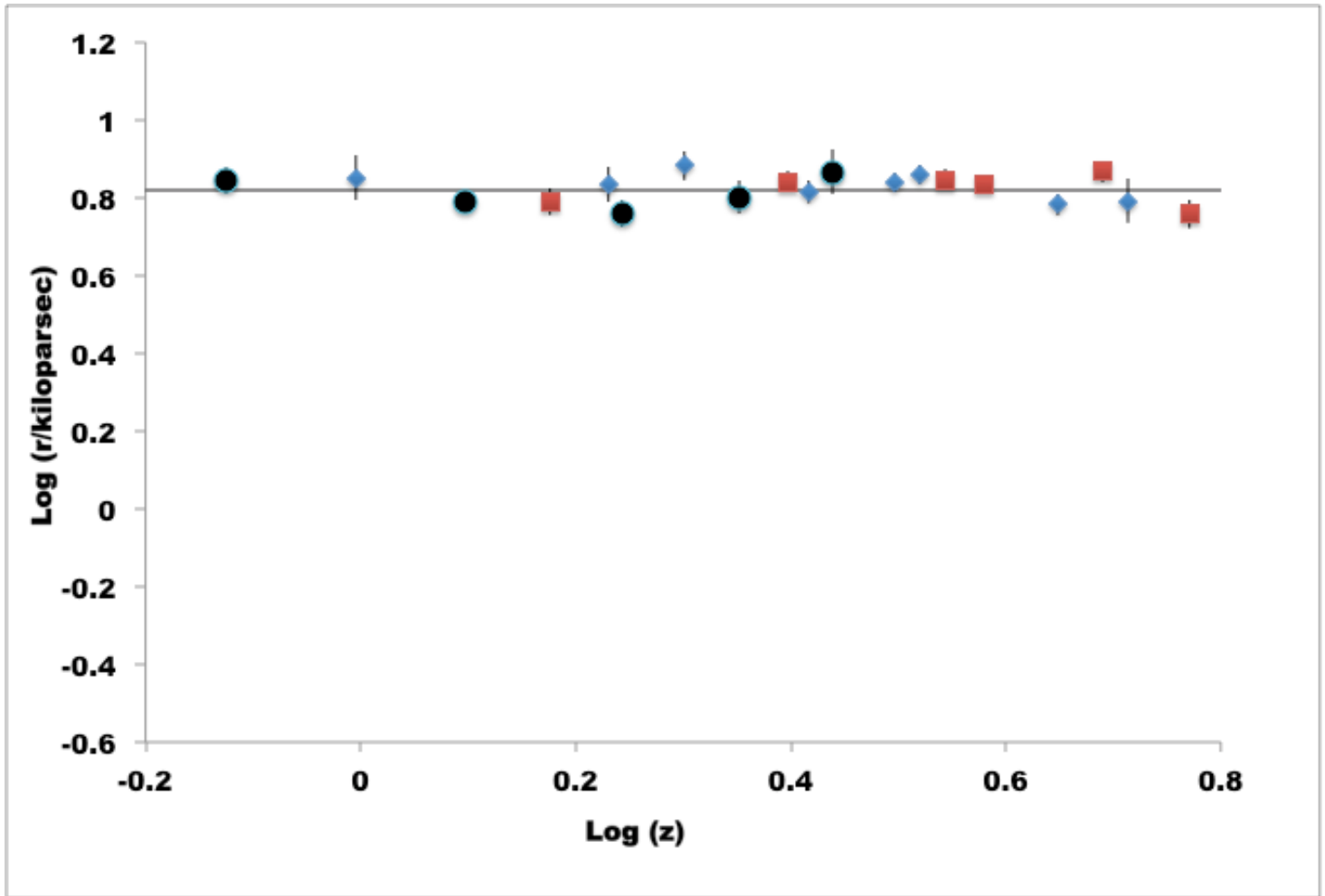


Figure 2. The log radius of galaxies assuming a non-expanding universe is plotted against the log of  $z$ , where  $z$  is the redshift. Black circles are samples of elliptical galaxies and blue and red symbols are samples of spiral galaxies. As predicted by the non-expanding hypothesis, the size remains constant for galaxies of the same brightness (luminosity).

“In this hypothesis, the simple linear relation between the redshift of light and distance is caused by something that happens to the light as it travels, not by the expansion of space,” Lerner explains. “Right now, no one knows what could cause this, but the linear relationship and a non-expanding space make predictions that fit the data, while the expanding universe predictions don’t fit. The entire history of scientific-technological advance has shown the value of judging theories by their predictions. A hypothetical aircraft, for example, using a theory of aerodynamics that needed to be fine-tuned after every few miles of flight would scarcely be useful. Of course, broad hypotheses such as that of an expanding universe, need to have their predictions tested against all available sets of data—this is just one.”

The present research is an extension of earlier work done by Lerner at LPPFusion with colleagues Dr. Renato Falomo (INAF – Osservatorio Astronomico di Padova), and Dr. Riccardo Scarpa (Istituto de Astrofisica de Canarias, Spain) and [published in 2014](#).

More detailed background on this paper can be found [here](#).

# Wefunder Crowdfunding Enters Final Month

It is down to the wire with LPPFusion's critical equity crowdfunding campaign on the Wefunder website. The campaign will end April 23, so it has entered its last month. So far, a bit over \$640,000 has been invested by just under 300 investors. The campaign is right on target in terms of getting just over \$2,000 per investor, but now lags behind LPPFusion's goal as to the number of investors. To reach our ultimate goal of \$1 million we still need nearly 200 more investors in the final month. Generally about 20% of investors come in during the last two weeks of the campaign, but to reach our goal we should be getting in nearly half a dozen investors per day from now on.

The key problem is getting more people to know about the campaign. Overall, nearly one person in eight who views our video on the Wefunder site invests, so we know we are getting our message across to those who visit. But far too few people are visiting. To address this problem, Director of Communications Ivy Karamitsos is launching an advertising campaign through social media. In addition, we hope that some press attention will result from Chief Scientist Lerner's recent publication. But we also need the help of everyone who supports the Focus Fusion effort to share information about the Wefunder campaign as widely as possible in this critical final month. Please help us make our goal!

## New Fusion Industry Alliance Formed, LPPFusion Joins

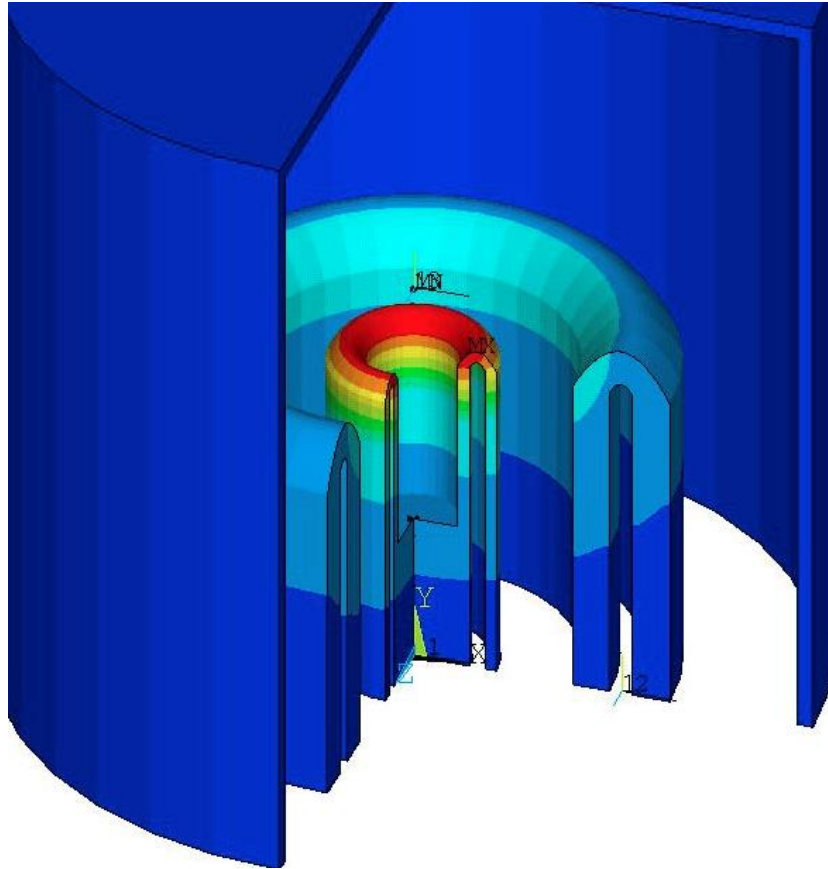
A dozen private fusion companies, including LPPFusion have joined together in an alliance to promote fusion and to try to get government funding for a broad-based approach to fusion. The new alliance consists of a few cooperating organizations—the [American Fusion Project](#) (AFP), which seeks to educate the public about the benefits of fusion energy and the main alternative route to get there; the [Fusion Industry Association](#), which seeks to educate Congress and the Federal government generally about the need to diversify and increase fusion funding; and the [Fusion Consortium](#), which is seeking an XPrize for fusion. In addition to LPPFusion, which just joined the initiative, other companies in the alliance include General Fusion, TAE (formerly Tri-Alpha), Tokamak Fusion, Hyperjet Fusion, CTFusion, EMC2, MIFTE, Commonwealth Fusion and Compact Fusion. Los Alamos National Laboratory and University of Alabama are also members.

The AFP came out of an initiative by the American Security Project, a non-partisan organization that has long advocated fusion energy research as a key part of ensuring future energy security. The Fusion Industry Association has been emerging since the fall of last year and is now actively advocating in Congress with the goals of promoting regulatory certainty, and redirecting government financial support. The Fusion Consortium, which is independent of the other two groups but cooperates with them and has overlapping membership, is aimed at starting the fairly complex and costly process of going to the XPrize organization to establish a prize, perhaps \$100 million, for the first company to achieve net energy from fusion.

## Thermal Study of Electrodes Begins

The cooling of the plasma focus electrodes, especially the anode, is likely to be the toughest engineering problem to be faced in going from a demonstration of net fusion energy in the lab to a working fusion generator. To get a

head start on the problem LPPFusion investor Jerry Black has teamed up with fellow engineers John Blanton and Mike Ruthemeyer to simulate the heating process. The team met while they were all working on the design of giant General Electric turbines. Initial studies (Figure 3) indicate that, as the LPPFusion research team anticipated, the greatest heating will come from the X-rays emitted by the plasmoid. These studies also confirm the vast superiority of beryllium, which minimally absorbs X-rays, therefore minimizing electrode heating. Further studies will make the X-ray emission spectrum and the distribution of current in the electrodes more realistic. Such studies will speed up the engineering phase once the research phase is complete. Thanks to Jerry for organizing—and funding—this effort!



*Figure 3. An initial simulation of heating of the electrodes by a single pulse of the FF-1 device. Redder colors indicate hotter regions. As can be seen, the tip of the anode (inner cylinder) receives the most heating from the plasmoid's X-rays, which also penetrate deeply into the rest of the anode and the cathode (middle cylinder). The walls of the chamber (outer cylinder) remain cool.*