Report September 21, 2023

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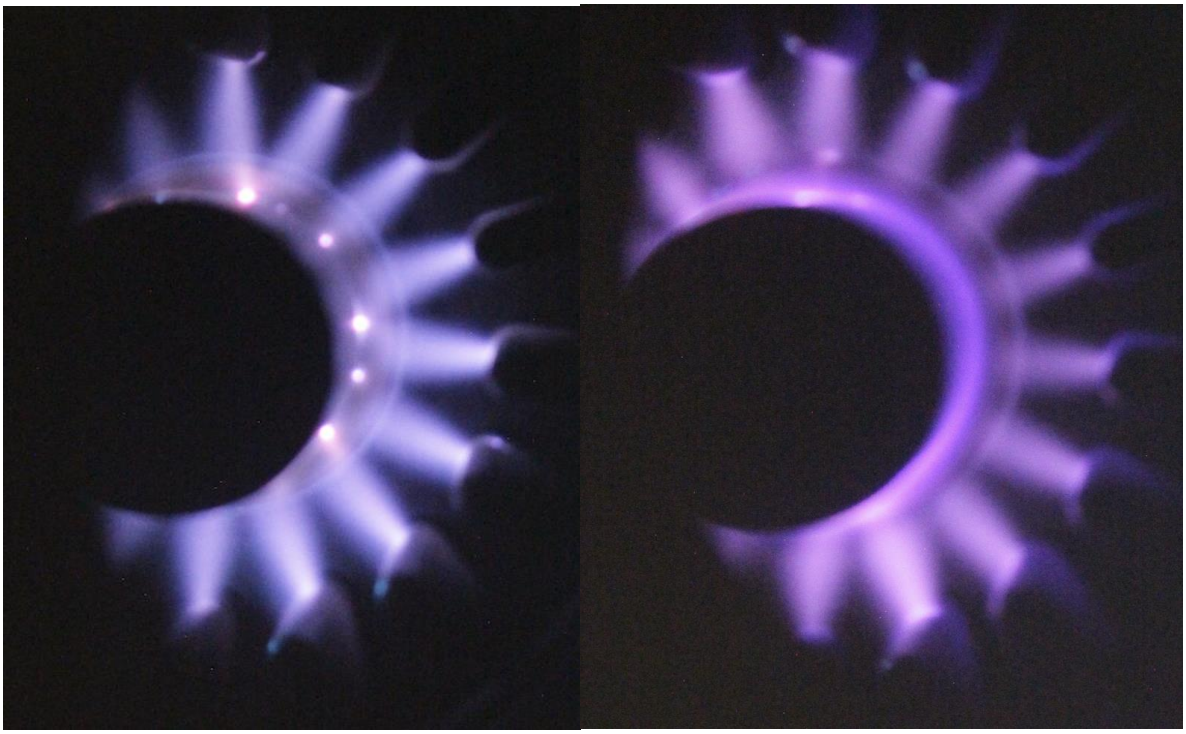
Moving toward Symmetry and Hydrogen-Boron Tests

The LPPFusion team is getting closer to firing our FF-2B experimental fusion device with hydrogen-boron fuel (also called pB11) but we're not quite there yet. We're moving forward along two paths. First, Research Scientist Dr. Syed Hassan is continuing to upgrade our device to hydrogen-boron operation. He's completed the many steps needed to get total remote functioning, so that we can stay in the control room all day while firing the device in the next-door X-room (X for experimental). While the main fusion reaction produces no radioactivity, a side reaction produces the very short-lived radioactive isotope carbon-11. So, we have to stay out of the X-room until the carbon-11 decays away overnight. In the control room, we have the meter of concrete that surrounds the X-room shielding us from any radiation.

With this task done, Dr. Hassan is working on the exhaust system that will ensure only pure hydrogen is released to the facility roof. He's also upgrading the device heating system that is needed to warm up our decaborane powder (the hydrogen-boron compound we will use) so it produces the vapor we need to fill the vacuum chamber where the fusion takes place.

On the other path, Chief Scientist Eric Lerner is continuing work to produce a symmetrical breakdown when we fire FF-2B with hydrogen boron. Breakdown is when a gas turns into a plasma that can carry electricity. This process needs to be symmetric around our cylindrical anode so that we will get symmetrical compression of the plasma into a high density, high temperature plasmoid. That's what's needed to burn the hydrogen-boron at billions of degrees.

Using a combination of a glow discharge current, to get the breakdown started, and a mixing gas to help stabilize the current, we've made progress here too. The right image shows the much better symmetry we've achieved and the left image shows where we started out in July. Back then, nearly all the current was concentrated in the bright spots while now it is nearly all evenly spread into the pink ring. The change in color is due to the mixing gas.



We started in July (left) with a very unsymmetric breakdown, with the current focused in the bright spots. Now (right) the breakdown is more symmetric, with the current mostly spread out in the pink ring and just a little in the two bright spots. The anode (central black region) looks oval in the right-hand image because the current is concentrated in a thin sheath while in the left-hand image, it spreads out up the side of the anode. Change in color is due to the addition of a mixing gas.

We're not where we need to be yet. For one thing, we still need to get rid of a few tiny specks of metal to get rid of the remaining bright spots and get perfect symmetry. More critically, we don't get the near-symmetrical discharges every time. It's more like one in three.

Since the breakdown process of stripping electrons from the atoms is sufficiently complex it is hard to predict with equations, we need to do more trial and error to get the best and most repeatable conditions –we've done 300 tests already since July. Fortunately, we are using our trigger system, not the main capacitor bank, for these tests. So, we can do them quickly and we expect to get to the goal soon.

Next Step To Fusion: $300,000 by Oct.1

While we are moving rapidly towards our first tests with hydrogen-boron (pB11) fuel our progress is still slowed by lack of additional staff.

That's where we need all of you. Our next financial goal in our 2023 Wefunder campaign https://wefunder.com/lppfusion is to reach $300,000 by Oct 1. This is the next step in reaching our ultimate goal of raising $ 2 million dollars, enough to hire the staff we need and complete the steps to demonstrating net energy production in the laboratory. We are at $245,000 so we have $55,000 to go. If you have been considering investing—now's the time, now's the hour, now's the time for Fusion Power! If you have already invested, please spread the word any way you can to get more investors to hear about us.

Big Bang Meltdown Accelerates in New York Times, Asia Times, Conferences

Another big step towards an open, public debate over the validity of the Big Bang, expanding-universe hypothesis came September 3 with the publication in the *New York Times* Opinion section of an article titled "Crisis in Cosmology " (and titled online as "The Story of Our Universe May Be Starting to Unravel*"*) by Dr. Adam Frank and Dr. Marcelo Gleiser. Now it is hardly news that there is a crisis in cosmology. Researchers have been discussing that for nearly 30 years and it has been big in the mass media since 2019. But what is new and important is the admission by well-known cosmologists like Frank and Gleiser that new observations mean that we may need "a radical departure from the standard model" of cosmology, one that requires us "to change how we think of the elemental components of the universe, possibly even the nature of space and time". In fact, these authors say we may need a "new story of the universe".


The New York Times

The Story of Our Universe May Be Starting to Unravel

Sept. 2, 2023

On Sept. 6, *Asia Times* published a reply to the NY Times piece by LPPFusion's Lerner, where he wrote:

"What the authors don't actually say is that there already is an alternative "story of the universe" that is being widely debated among researchers: the story of an evolving universe without a Big Bang or the expansion of space. This is the scientific hypothesis, sometimes referred to as "plasma cosmology", developed by Noble Laureate Hannes Alfven and elaborated by myself and many others, that the phenomena we observe in the universe can be explained by the physics we observe in the laboratory—the physics that describes electromagnetism, plasma, gravitation and nuclear fusion reactions. No origin of the universe in time, no inflation, no dark matter, nor dark energy is needed.

Now, Dr. Frank knows of this alternative. In December of last year, he wrote an opinion piece in *The Spectator* where he prominently mentioned that I was an advocate of "an alternative model of cosmology" and the author of an August, 2022 article on the Institute of Arts and Ideas website, titled "The Big Bang Didn't Happen" which ignited widespread debate in the cosmology community and among sections of the public. At that time, Dr. Frank wrote that the new images from the JWST (James Webb Space Telescope) posed no threat to the "standard model": "Does any of this challenge the Big Bang itself?" he asked, rhetorically. "Not even by the tiniest sliver. If we know the Big Bang to mean the idea that the universe started out in a smooth, hot, dense state that was set into expansion which led to evolution of structure, then no, the Big Bang has not been disproven. If anything, it's

proven the most basic feature of the theory: cosmic evolution. The results of the James Webb telescope reinforce the idea that the universe does have a story and, most importantly, we are somehow learning to tell it."

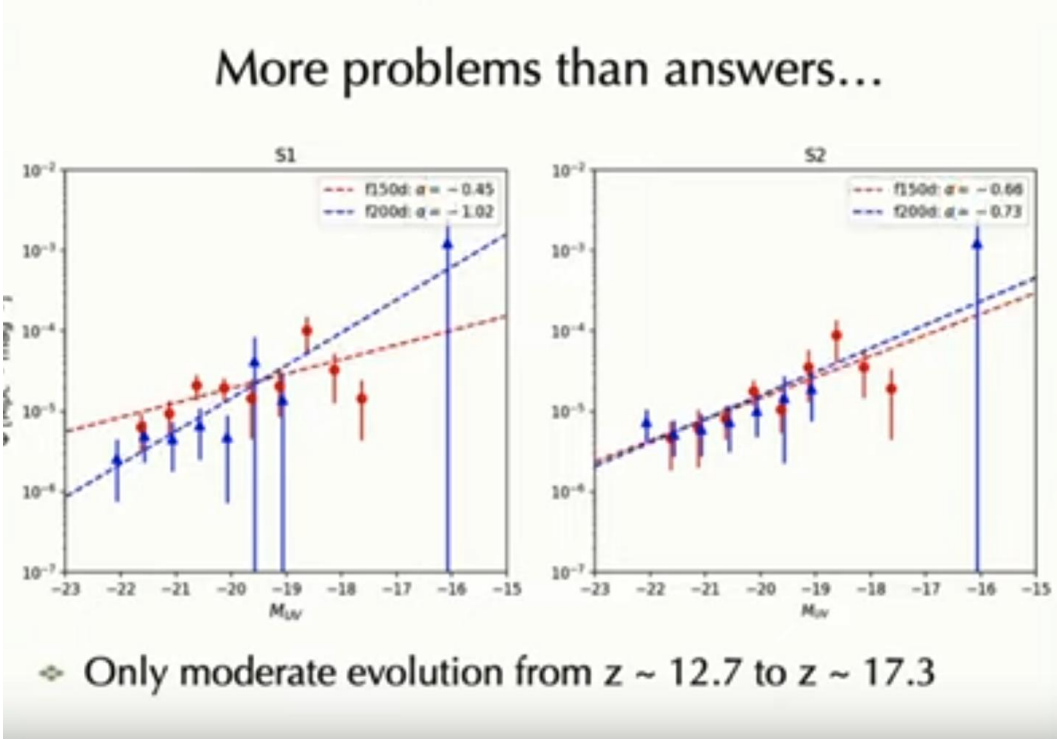
It's clear that Dr. Frank's views have themselves evolved quite a bit in the last nine months as new data has flooded down from JWST, dimming the hopes of Big Bang cosmologists that the theory needs only "tweaks". Then, Dr. Frank was sure that the Big Bang **was** the story, but now he thinks we just might need a "new story", even a "new way to tell stories". So why doesn't he say outright that there is a possibility that the Big Bang never happened, that the universe may not be expanding, that the story of its evolution might be one without a beginning? " You can read the rest of the reply at *Asia Times* or here.

This exchange in the media is not the only development in recent weeks on the Big Bang debate. On September 11-14, NASA's Space Telescope Science Institute, which runs JWST, hosted a conference on the first year of JWST results, which they put on YouTube for all too view.

Concern about the validity of the Big Bang was not obvious in most presentations, which were overwhelmingly presenting new observations, not interpreting them. But that the debate was a lively matter of discussion in the corridors was made clear by one theoretician, Andrey Kravtsov, who began his presentation (session 3, 1:21:12) showing the "headlines many of you have seen" that questioned the Big Bang theories' validity and that have "caused anguish" but "motivated him". He also concluded his talk by saying "so you see the BB is fine", which no Big Bang advocate would ever have said before JWST - because of course "it went without saying".

His talk showed a level of desperation in attempting to explain the huge gap between Big Bang predictions and JWST observations. He presented a model of galaxy evolution with more adjustable parameters than he could list and then showed that by tweaking one, he got the "prediction" of the abundance of galaxies at high redshift (high distance) to jump by more than a factor of 1,000. Lerner commented on the YouTube page that such huge adjustability shows that the model "predicts in reality precisely nothing and can be fitted - by adjusting parameters - to practically any data."

Many of the papers presented in the conference revealed more "impossible galaxies" whose existence contradicted Big Bang/expanding universe predictions, but confirmed the predictions made by Lerner and colleagues based on a non-expanding model. In session 2, 49:46, Dr. Haojing Yan presented the data that Dr. Kravtsov was so desperately trying to fit. It was the measurement, using JWST images, of how the abundance of bright galaxies had changed from a redshift of 12 to a redshift of 17. While the Big Bang prediction was that, at a time when the universe was supposedly only 200-300 million years old, there should be a very rapid decline in the number of galaxies, the data actually shows almost no evolution. Earlier JWST data had already showed almost no evolution from z=9, after quite rapid evolution (a decrease in number of galaxies) up that that z. So instead of evolution accelerating (downwards) as the Big Bang is approached, it *slows down* or halts. This is in complete contradiction to Big Bang predictions, but exactly how a non-expanding universe was predicted to evolve: the further back you go, the slower the evolution.



The abundance of galaxies (galaxies per unit volume for a given luminosity) is plotted here against absolute magnitude, with more luminous galaxies having larger (negative) magnitudes. The abundance is measured two different ways in the right and left hand frames. Those at around a redshift of 12.7 are red dots and those at around a redshift of 17 are blue dots. Note how in the right-hand frame the blue and red dots are almost on top of each other, indicating no change in galaxy abundance, while the Big Bang predictions are that the blue dots should indicate a thousand times lower abundance than the red ones. From STScI conference presentation of Dr. Haojing Yan.

We'll report more news from the conference and other papers in the next report—it is coming in faster than we can report it!

LPPFusion Hosts Dialogs on the Big Bang Debate

As part of our contribution toward open debate around the key issues in cosmology, LPPFusion will be hosting two online Dialogs on the Big Bang Debate in October. On October 10 we will have Dr. Rajendra Gupta of the University of Ottawa talking with LPPFusion's Lerner. Dr. Gupta made world-wide headlines on July when he proposed merging the non-expanding tired light hypothesis to explain the Hubble redshift relation with a slower expanding universe model that puts the Big Bang back to 26 billion years ago. On October 17, Lerner will talk with Dr. Francesco Sylos-Labini, Research Director at the Enrico Fermi Research Center (Rome, Italy). Dr. Sylos-Labini has been a leader in the mapping of large-scale structures in the universe. On the largest scales, these structures are too big to have formed in the time since the hypothetical Big Bang. There will be an open Q and A from the zoom chat at the end of each event.