Report November 19, 2024

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Long-Awaited Boron Tests Start

LPPFusion Chief Scientist Eric Lerner has announced the long-awaited start of tests with hydrogen-boron fuel in the FF-2B fusion experimental device. He made the announcement during his November 11 presentation at the 17th International conference on Plasma Science and Applications in Kuala Lumpur, Malaysia. The first shot using decaborane, a compound of hydrogen and boron, occurred on November 1, with a second shot on November 4.

These initial tests did not yet reach the conditions needed for fusion reactions. Due to imperfections in the heating system, the research team was not yet able to fill FF-2B's vacuum chamber with the needed 1.5 torr for decaborane, with the shots using only 0.8 torr. As a result, only a very small "pinch" was achieved, meaning that the compression of the plasma was too small to create the density and temperature needed for fusion reactions.

The research team, possibly assisted by a thermal engineer, expect to find and plug the "heat leaks" that are preventing the chamber from reaching the necessary 80 C in all parts. This temperature is needed because decaborane is a solid powder at room temperature and needs to be heated to emit enough vapor to fill the chamber. Like water vapor condensing on a cool surface, the decaborane vapor will condense on any cooler surfaces within the chamber. However, such cool spots can't be avoided just be turning up the heat. Decaborane melts at 100 C, which would greatly reduce its surface area and make vaporization too slow. As well, the Mylar insulation in the device must be kept cooler than 110 C to avoid damage. So, the tricky part is to keep all parts of the vacuum system between 80 and 90 C. The team expects to achieve this goal in December.

Even without fusion conditions, the tests produced some encouraging results. First, the fact that the November 1 shot produced a pinch (as shown in the dip in the current race in Figure 1) even if a small one, with only half the gas needed, is an indication that a strong pinch should not be too difficult to achieve with the right pressure. Also, Lerner had expected that the chemical breakdown of the decaborane after the shot would coat the windows of the vacuum chamber so heavily that they would be totally obscured. However, this was not the case and the windows were clear enough in the second shot that a good optical spectrum was obtained, showing the anticipated lines of boron (Figure 2).

Based on these initial results, we hope to perfect the heating system and attempt fusion-producing shots before year-end.

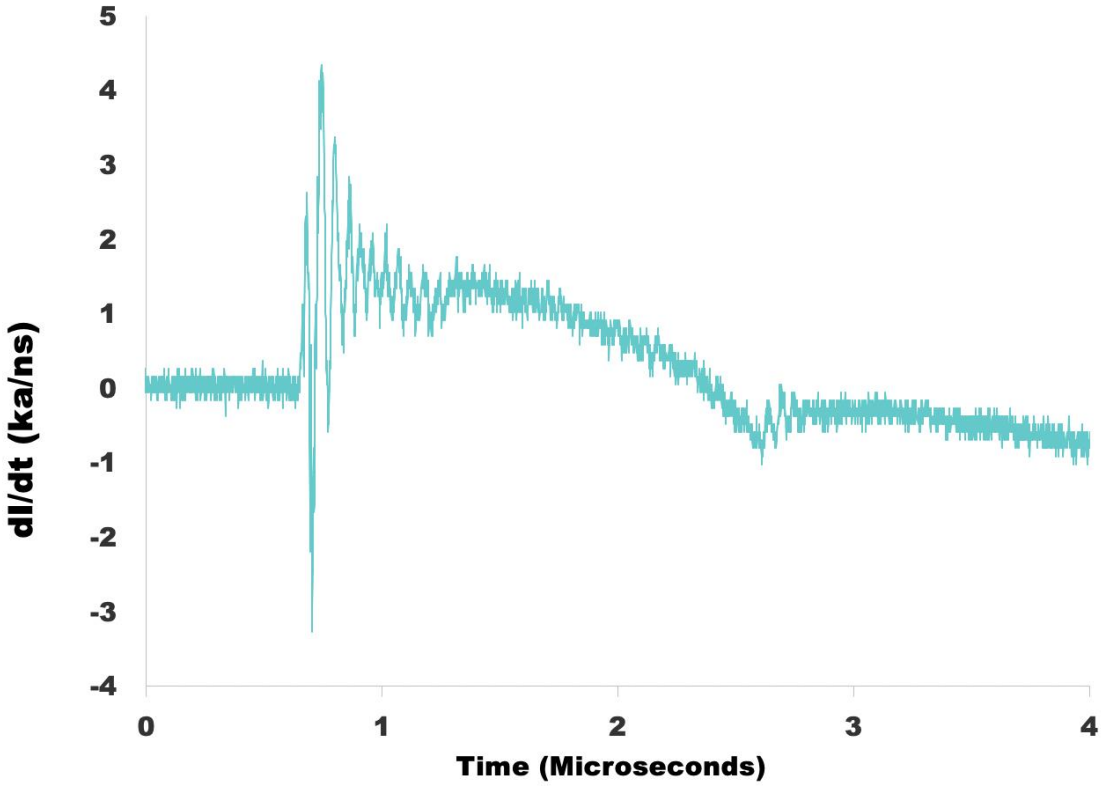

Figure 1. This graph of the rate of change of the current in the first shot with decaborane fuel shows the small dip at 2.7 microseconds, indicating a small pinch occurred.

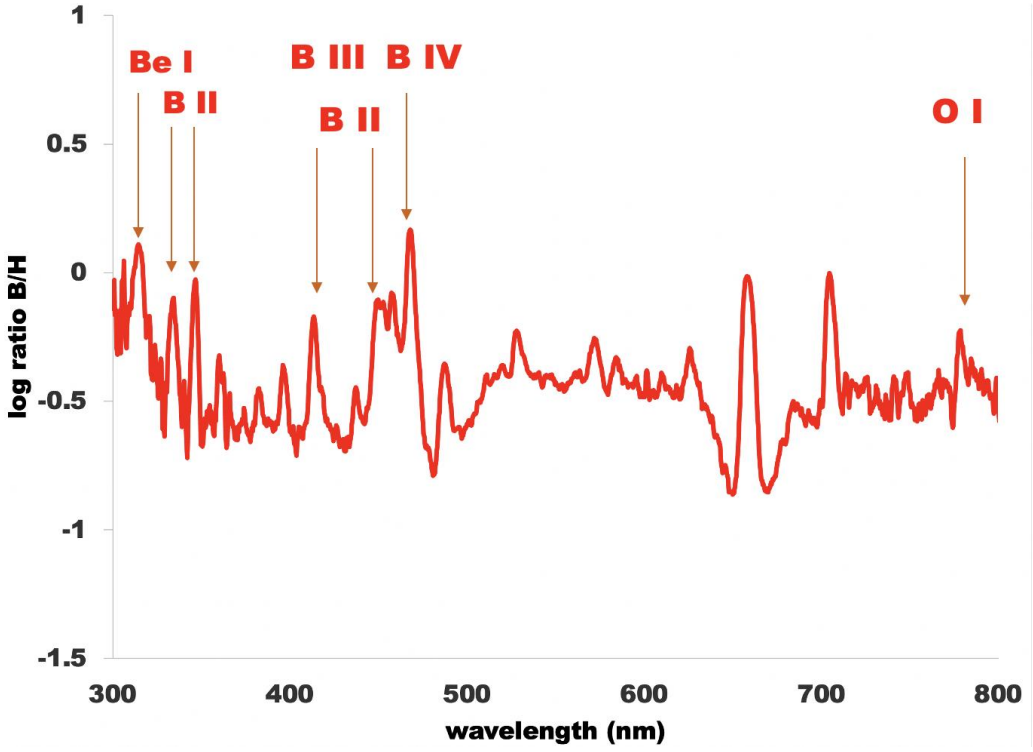

Figure 2. Spectrum of second decaborane shot, showing the lines of boron (labeled with B) as well as beryllium (Be) from the anode(leftmost) and oxygen (O) from oxides(rightmost).

LPPFusion is Hiring

We are seeking a Research Scientist/Research Engineer to join the small team of the company that is leading the race to proton-boron fusion energy. This is a full-time permanent position. We seek a researcher who will assist in all aspects of our experiments including carrying out experiments, data analysis, equipment maintenance and repair and the design of new parts and new instruments. We provide competitive pay, full health insurance, and a stock option plan.

Requirements: the type of degree is not important, but we need someone with **solid experience** in an experimental lab and with high voltage equipment. Pulsed-power experience a plus. Unlimited enthusiasm for fusion energy a must! We very much regret that, due to the nonfunctional immigration policies in the US, we are unable to sponsor or take over sponsorship of an employment Visa at this time. Applicants must already be authorized to work in the US. We are an Equal Opportunity Employer. We encourage qualified women and men of all backgrounds to apply. Please send resumes to fusionfan@lppfusion.com.

We also need, for a short-term contract, a thermal engineer who lives in the NY-NJ area. This person would help us to optimize the heating system on FF-2B to achieve full pressure with our decaborane fuel.

Online Briefing and Virtual Lab Visit in December

LPPFusion will have the first in a series of online briefings for investors on December 5 at 4 PM Eastern Time. These briefings are offered as a "perk" for larger investors in our fusion work. Those who have invested at a $2,000 level in either Wefunder or our new Start Engine campaign, as well as any Reg D investor (all of whom invested $5,000 or more) can participate. The in-depth briefing by our team will cover the latest lab results, our fundraising campaigns, publicity and future plans. We'll have plenty of time for Q and A. If you qualify and are interested in attending, please mark the date. We'll be sending registration information closer to the event.

We'll also have the first of series of group online tours of the lab on December 12 at 4 PM Eastern Time. This is for any investor who has invested $1,000 or more. Again, we'll have time for lots of Q and A.

Lithium Between Stars, Nails in Big Bang Coffin

At the end of September, an international collaboration from Italy, France and the US published yet more bad news for the Big Bang Hypothesis. Observing interstellar gas in the Small Magellan Cloud (SMC), they found the abundance of lithium was a factor of four below Big Bang predictions. The SMC is a satellite galaxy of our Milky Way. It's visible in dark skies to the naked eye from the earth's Southern Hemisphere.

The abundance of lithium is one of the key predictions of the Big Bang. If the universe went through a hot dense phase, then nuclear fusion reactions would have produced a certain amount of lithium: four lithium atoms for every

ten billion hydrogen atoms. However, for decades astronomers have known that lithium abundances in old stars are much lower than this prediction. As the stars get older, as indicated by less and less iron in their atmospheres the abundance of lithium shrinks to zero.

This is exactly what was predicted long ago by the non-expanding universe hypotheses, which hypothesize the production of lithium by cosmic rays in existing galaxies. These cosmic rays' fragments heavier nuclei, such as carbon and oxygen, producing small amount of lithium that are then incorporated into newly formed stars. Since the oldest stars in a galaxy, with the least iron, have formed before there was enough time to accumulate lithium, they have the least amount.

There have been many ad hoc mechanisms prosed trying to explain how the stars destroy the exact right amount of lithium to mimic the non-expanding, galactic origin hypotheses, but all have failed.

The new observations blow an even bigger hole in the Big Bang theory. Using the Very Large Telescope of the European Southern Observatory in Chile, the team recorded the spectra of Sk143, a very bright star in the SMC. The spectra contain multiple absorption lines from material in the interstellar medium of the satellite galaxy. There is no known or hypothesized mechanism to reduce the amount of lithium in the ISM—stars can only add to the amount. Yet the Li abundance was four times lower than the amount predicted to have been created by the Big Bang. As the authors conclude, this clearly proves that no "depletion mechanism" in stars can fix the Big Bang's wrong prediction of lithium abundance.

Cosmology Workshop is Online

The Challenges of Modern Cosmology -2 workshop, held October 17-18 is now online here:

Part I & II: https://youtube.com/live/ErHB4Ckzgu8
Part III: https://youtube.com/live/0sLCr-n8u5U

The workshop examined the growing contradictions between observations and the "concordance cosmology" based on the Big Bang and the hypothetical expansion of the universe.

At the conference, LPPFusion's Lerner presented (at 2:05 of first video) his and colleagues Riccardo Scarpa, (Instituto de Astrofisica de Canarias, Spain) and Renato Falomo, (INAF – Osservatorio Astronomico di Padova, Italy) latest results on JWST and other data that rule out expansion. In other presentations, Martín López-Corredoira (Instituto de Astrofísica de Canarias) reported (at 1:29 of first video) on galaxies that are older than the Big Bang and Dr Sebastian Von Hausegger (University of Oxford) surveyed (at start of first video) the wide variety of observations in conflict with the dark-matter dark-energy Big Bang hypothesis.