Report May 20, 2026

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FF-2B Reassembly Complete, Bake-Out Starts

LPPFusion's Research Team has finished the reassembly of our FF-2B experimental fusion device. We've started the bake-out process where the device is heated under vacuum to remove water molecules that cling to metal surfaces. Assuming the bake out goes as expected, we'll be able to start new experiments with hydrogen-boron fuel in early June.

In the second half of March, we completed disassembly of FF-2B, removing the cathode for cleaning. During the previous experimental run, both cathode and anode had been covered with a layer of reddish beryllium-boron and we had to remove that layer from the cathode by polishing, as well as replace the cracked anode with a new one. After disassembly, Research Scientist Dr. Syed Hasan pointed out that the ceramic insulator was contaminated with material from the silicone gasket that it rests on. (Fig.1)

Figure 1. Insulator removed from FF-2B shows dark ring of siloxane deposition around the base of the insulator and asymmetric deposits (compare two sides shown) further along the hat, showing imperfect centering on the cathode surrounding the insulator.

Thanks to Research Assistant Sam Grund's work to get our new Fusionscope data analysis software working, we were able to look back at our spectroscopic data to see in our shots the bright line (at a wavelength of 703 nm) that is characteristic of silicon. This was proof that the silicon compounds, called siloxanes, that had leaked onto the insulator had entered our plasma. The siloxanes in the plasma would have produced serious problems in our boron experiments by draining energy from the current sheath and possibly creating major asymmetries in the compression, preventing the formation of the high-density, high-temperature plasma where boron-hydrogen fusion would take place.

We'd encountered this problem in earlier years and had addressed it by a high temperature bake-out of the gasket prior to putting it in the machine. However, we had mistakenly assumed that once the volatile liquids had been baked out of a particular gasket, the supply was exhausted. Since we used a previously-baked-out gasket in the last assembly and still got leaked volatiles, this assumption was proven false. Moisture from the air evidently combined with material in the gasket to produce new liquids, which then squeezed out of the gasket onto the insulator. So, in early April, we did an additional high temperature bake out in a small vacuum oven to get rid of any remaining liquids.

The asymmetrical pattern of deposits on the insulator (the two sides are shown in figure 1) indicated that the centering of the insulator on the cathode that surrounds it was not as good as we thought it was. Our data showed that poor centering could also prevent symmetrical compression and good fusion yields. We aimed to do a better job in this assembly.

This turned out to be more difficult than we thought, but in the lengthy process during April we discovered a couple of small structural flaws that had prevented accurate centering. The large steel plate that the anode was attached to was able to tilt slightly, offsetting the anode as the bolts connecting it to the steel plate were tightened. Dr. Hassan inserted 0.05-inch steel washers at the corners of the square plate to shim closed a small gap between the steel and the underlying Mylar, stabilizing the plate. As well, some small imperfections in a Teflon ring caused it to push against the Mylar, again throwing off centering during tightening. Dr. Hassan corrected this flaw with a touch of filing.

With these corrections, Chief Scientist Eric Lerner and Dr. Hassan managed to center the insulator on both the anode and cathode to within a thousand of an inch (25 microns). However, the arduous manual process convinced us that we need a much more automatic way of centering. The team, including Mechanical Engineer Rudy Fritsch, is now working to design custom centering tools that will do the job in minutes rather than weeks and that will be ready long before the next assembly.

Can We Get a Fusion Candidate on the Ballot?

Volunteers Needed in NJ

To escape the dead-end that fossil fuel dominance has led us to, the world urgently needs hydrogen-boron fusion. We at LPPFusion are confident we can demonstrate the scientific feasibility of pB11 fusion in the immediate future with the help of our investors and supporters. But to develop a working prototype and especially to mass-produce the millions of generators we need for the fusion future requires resources that only governments can provide.

Here in the United States, despite verbal support for fusion energy, neither Democrats nor Republicans have taken any actions towards providing the scale of resources required. This is not surprising, as both parties are dominated by billionaire donors who are heavily invested in either fossil fuels or in the giant financial institutions whose solvency depends on the gusher of petrodollars. **Only a political movement independent of the two parties can possibly start to redirect public resources toward a fusion transition.**

"Sometimes to get the ball rolling, you have to pitch in yourself" says LPPFusion's Chief Scientist Eric J. Lerner, **who is announcing his candidacy for Congress in NJ's 7th District.** "I'm not running as an individual, but as part of a growing slate of independent candidates pledged to a common platform. A core part of that platform is a government-funded crash program of research, development and mass production **to speed a transition to a fusion powered economy**." Other candidates pledged to run on the same six-point platform, including fusion energy, are Lily Benavides, running for the US Senate in NJ, and Barry Bendar, running for Congress in the NJ 4th District. More independent candidates in NJ and across the country are expected to join in.

To get on the ballot, Lerner needs the help of fusion supporters in the NYC-NJ area. "We need to collect 500 signatures from 7th district registered voters by June 1. Just 250 are legally required but possible legal challenges require getting twice that many. We can do that with a couple of dozen volunteers getting 20 signatures apiece", explain Lerner**. We're inviting anyone who is a US citizen and 18 years old, no matter where you live, to come to Westfield NJ on this Saturday May 23 from 1:00 to 3:00 PM or next Saturday, May 30 at the same time**. **We'll follow up the petitioning with lunch at a great restaurant with Lerner and all the volunteers**. "If you want to help, get fusion on the ballot," says Lerner, "contact me at elerner@igc.org and I'll give you the details of where to meet. Please do it by the Friday before, so we can get the reservations right at the restaurant."

No LPPFusion money will go to support this campaign, nor will it conflict with our research. "We're doing petitioning while FF-2B is baking out.", Lerner explains. "During the summer, we'll be focusing on the experiment that we expect will get us breakthroughs in boron fusion. Then we'll be campaigning in September and October while our experiment gets further upgrades. If elected, I'll start serving in 2027, when we expect the project to be transitioning to the development phase. That's when the engineers take over and the time I need to devote to the project will be much less. Win or lose, these independent campaigns for a common platform will offer US voters a real alternative to the billionaire-backed parties. We have to start the ball rolling."

Nature Article on Currents in the Cosmos

The plasma theories that guide LPPFusion's research have in large part been based on observations of plasma in nature on the large scales of the cosmos. A key phenomenon both in these plasmas and in our FF-2B device is the formation of plasma filaments—dense vortices of electric current and magnetic fields that pull plasmas into them like electric tornadoes. The study of these filaments was pioneered by Noble Laureate Hannes Alfven and his colleague Carl-Gunne Falthammar. Based on this work, Lerner developed quantitative theories both of the functioning of dense plasma focus devices like FF-2B and of various cosmic phenomena.

Over the past few decades, more and more researchers have observed and tried to understand these filaments and the magnetic fields that confine the plasma within them. Unfortunately, much less attention has been paid to the electric currents that generate, and are guided by these magnetic fields. As Alfven pointed out as early as the 1970's, simplified mathematical models of plasmas which are relatively easy to use in computer simulations ignore the electric currents. They calculate the magnetic fields as if they were produced by a sloshing of an abstract fluid. In fact, in reality magnetic fields are produced **only** by electric currents or by rapid changes in electric fields.

Alfven was particularly aggravated that the misused mathematical models, termed magnetohydrodynamic or MHD, were his own invention, intended to approximately model very dense, unmagnetized plasma in stars like our sun. They were totally inapplicable to the highly magnetized plasms of space or fusion devices. He used his 1970 Nobel address to assail this misuse of his work. However, the convenience of the MDH approximation still tempted many researchers to use it in many applications where it was totally wrong.

But in recent years, more researchers have started to use non-MHD simulations and analysis to study the magnetic filaments and in the process recognize the importance of the electric currents generating the fields. One of the most prominent examples of this approach, aligning with the work of Alfven, Lerner, and colleagues, was a paper published in the January 21, 2026 issue of *Nature*, the world's leading scientific journal. Titled "Large-scale dynamos driven by shear-flow-induced jets" by B. Tripathi (now at Columbia University) and colleagues, the simulations show how tiny filaments, here called "jets", can grow rapidly into large-scale vortex filaments with electric currents, magnetic fields and plasma flows all aligned with each other. The paper explicitly showed the central role of currents in Figure 4 a (Reproduced here in our fig.2)

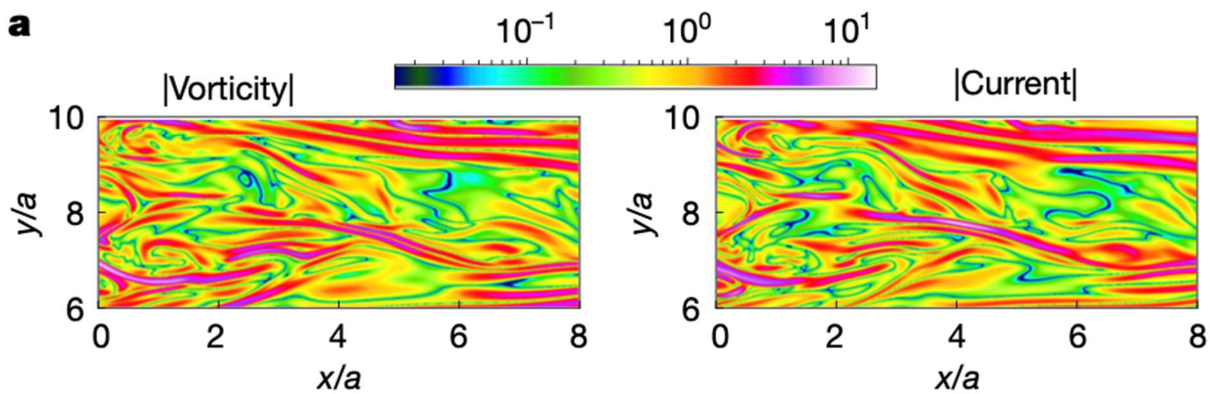

Figure 2. This figure from "Large-scale dynamos driven by shear-flow-induced jets" in Nature (Jan. 21, 2026) shows the formation of large-scale filaments of current (right-hand chart) that are precisely aligned with the motion of plasma in the filaments (left-hand chart). Vorticity is a measure of the spin of a fluid, so high vorticity regions are along the central axes of vortex filaments.

The prominence of this paper will help encourage more current-based modeling by other researchers. Such simulations can be used in the future to make more detailed predictions about filaments both in fusion devices and cosmic phenomena than are possible with LPPFusion's rougher calculations and simpler simulations. However, these supercomputer-based simulations do require significant resources of both researchers' time and of money for computer time.

Polish Experiments with Solid Boron Targets

At LPPFusion, we're using the hot, dense plasmoid produced by our dense plasma focus (DPF) device to fuse hydrogen-boron fuel. But two other DPF groups are taking different approaches to fusing hydrogen-boron or pB11. Both use solid boron targets, onto decaborane gas, as LPPFusion does. The group in Krakow, Poland uses a laser to vaporize the boron at just the moment that a hydrogen current sheath converged on the same spot. They have not yet reported results. The group using DPFs in Warsaw and Swierk, Poland hits the solid boron target with a hydrogen beam emitted by the DPF plasmoid. This group now has published their first results with some boron fusion detected, although not a lot.

After much effort over years to get the target to survive in high energy environment of the DPF, the group placed the target 20 cm from the tip of the anode in the Swierk DF-360 device, which has a radius of 6 cm (a bit more than double the size of FF-2B's anode.) They measured about 400 alpha particles/cm^2 at right angles to the proton beam. While the authors of the paper declined to estimate the total fusion production, something of the order of 10,000 reactions probably took place, releasing around 15 nJ of energy. This is a small amount compared with more than 0.25 J of boron fusion achieved with proton beams produced with lasers, using input energy comparable with PF-360's input of 100 kJ. It's possible that placing the target so close to the anode interferes with the production of the plasmoid that generate the proton beam in the DPF. However, achieving any boron fusion is an accomplishment and LPPFusion's Lerner has congratulated our colleagues on their progress.