LPPFusion Report
November 12, 2020

Summary:

- **SEC Allows Expanded Investment—LPPFusion Plans New Crowdfunding**
- **New Switch Parts Start to Arrive**
- **Simulations, New Ideas Aid Anode Final Design**
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SEC Allows Expanded Investment—LPPFusion Plans New Crowdfunding

In a big win for LPPFusion and other start-ups, the US Security and Exchange Commission, (SEC), voted Nov. 2 by 3 to 2 to adopt multiple changes in investment law. For us, the most important change is to allow Special Purpose Vehicles (SPVs) that permit unlimited numbers of non-accredited investors to invest in companies like ours. This will, starting in January, allow LPPFusion to raise investment money from thousands of supporters. We will continue to welcome accredited investors and such investments are possible right now.

Previous to this rule change, companies like ours, which are not listed on stock exchanges, could only raise money from 500 non-accredited investors, a number we have already reached. (An accredited investor must have $1 million in assets or $200,000 in annual income. Non-accredited investors are everyone else.) While greater numbers were not strictly prohibited, the SEC required companies with more such investors to become publicly listed when certain other criteria were met. This might have forced LPPFusion into a very expensive and risky Initial Public Offering (IPO) before we were ready.

Now, all non-accredited investors will invest through a Special Purpose Vehicle, a company set up just to funnel money to LPPFusion. The SPV will be listed as a single shareholder on LPPFusion's books. But potentially unlimited numbers of investors can buy shares in the SPV which will be identical to shares in LPPFusion.

This change will also allow LPPFusion to lower the minimum investment in future crowdfunding campaigns from the $1,000 that we previously had maintained. We will be sharing details of the next crowdfunding campaign as soon as they are decided by our management and Board of Advisors. Stay tuned!

New Switch Parts Start to Arrive

Parts for the new switches for FF-2B have now started to arrive at our lab in Middlesex, NJ. As explained in the last report, the biggest differences between the new switches and the existing switches are their number and size. Instead of one switch per capacitor in the old design, we will now have two switches, a total of 24. And of course, each switch will be about half as big. This will create a significant boost in current.

We have also received the base of our new anode, described in the last report.

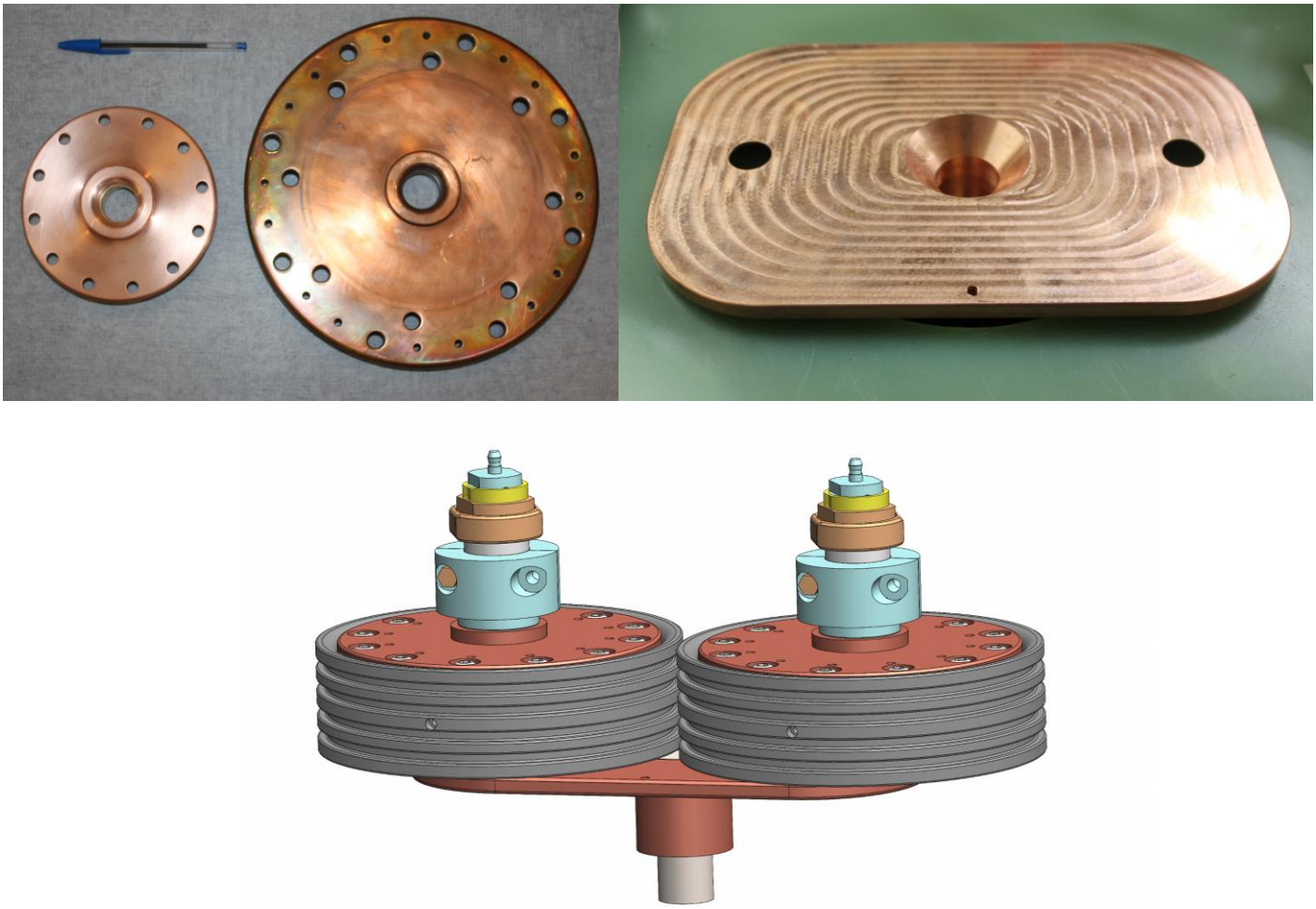

Fig. 1 The top plate of the new smaller switches (two dozen of them) is at far top left, with the old switch top plate next to it for comparison. *The central holes are for the spark plugs that trigger the switches (not shown). Two switches will be connected to each capacitor through the new switch holder (top right). Machining marks seen on the switch holder are extremely shallow—the surface feels glass-smooth to the touch. The complete assembly attached to each capacitor will look like the design drawing (bottom.)*

Simulations, New Ideas Aid Anode Final Design

LPPFusion Mechanical Engineer Rudy Fritch has continued to work with Chief Scientist Eric Lerner on simulations aimed at redesigning the anode stalk. These studies are critical to the next experiment, as the last anode cracked and the new one will be subject to greater currents produced by the new switches.

Fritsch used SolidWorks CAD program to first see how much the anode heated up from surface heating during the microseconds-long pulse of our FF-2B device. With the estimated heat fluxes that we calculated for the experiments we ran last year, the simulation calculated maximum temperatures of 500 C in a very thin layer only a few microns thick. He then fed the thermal results into a mechanical stress analysis. This showed that the heating in such a thin layer created big stresses in the beryllium anode as the layer expanded—up to 1Gpa (gigapascal) or about 140,000 psi (pounds per square inch). This is 3.5 times larger than the tensile strength of our beryllium. This implied that the Be would crack extensively well before it approached its melting point at 1300 C.

But our observation of the inner hole of the Be anode we used seemed to contradict that. (Fig 2) We saw only two big cracks and very smooth, regular waves as if the Be had melted without extensive cracking.

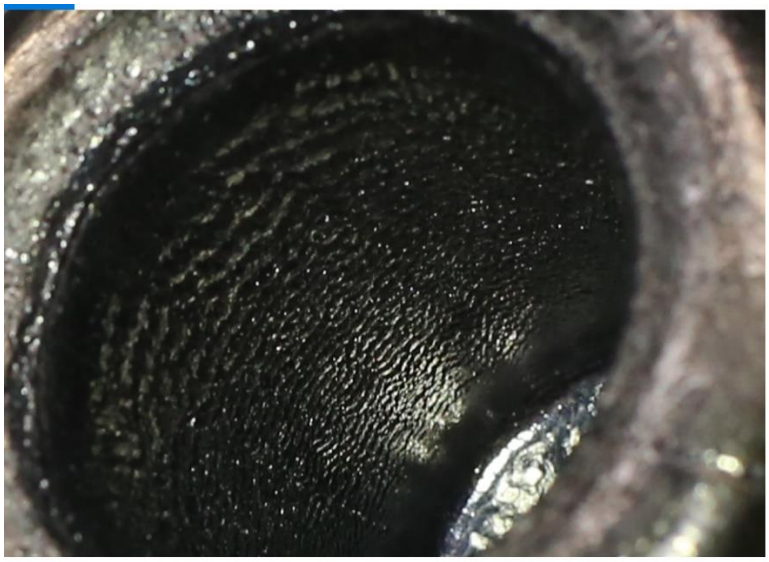

Fig 2. The inner hole of the anode after 200 shots. A ripple pattern implies the metal flowed like a liquid and the bright reflections indicate little or no rougness as would be created by extensive cracking.

In trying to figure this out, Lerner researched how Be properties might change as it heated up. He came across a 2015 study of how Be changes with very fast stress changes. The authors reach pressures of about 20 Gpa, some 20 times higher than those in our initial simulation, in about 100 ns by hitting the Be with an aluminum plate accelerated by high explosives. They had grooves in the Be so as to set up a Raleigh-Taylor instability that would make the grooves grow into waves. If the Be retained its strength, this would not happen. But, observed with fast X-rays, the Be behaved exactly as if it were a fluid, showing no measurable strength at all. It just flowed.

We think this is what happened with our Be—the sudden stress caused it to flow without either melting or breaking. This is good news, since it means this behavior might continue to the higher currents and stresses we expect with the new switches.

However, more simulations are needed to see how the anode vibrates after the sudden stress applied. Once we are sure what redesigns are needed to reduce stresses below the breaking point even for the higher currents we expect,

we will order the anode. Unfortunately, the simulations have been taking longer and are more complex to carry out than we had hoped. Considering this delay as well as supplier delivery times and year-end holidays we don't expect to have the re-assembly of FF-2B complete until January 2021. Of course, any delays are disappointing, but we feel that making sure of our redesigns will save time in the end.

Asia Times Covers Fusion-Cosmology Links in Lerner Interview

In another step in increasing LPPFusion's media profile, Asia Times is running a four-part interview with LPPFusion Chief Scientist Lerner. The series, titled "The Big Bang Never Happened, but Fusion Will" ties together Lerner's research in cosmology and fusion—something that has not been done before in any mass media coverage. As readers of our website and reports know, the theories guiding our improvements on the Dense Plasma Focus device came out of research applying processes observed in the DPF to astrophysical objects like quasars.

In just the first day after publication online, the article was read 200,000 times. The initial article is available for free, but the last three parts will be behind a pay-wall. Asia Times will allow them to be viewed by non-subscribers for $5.

LPPFusion is continuing to release new videos in the "Real Crisis in Cosmology" series, explaining how the Big Bang hypothesis is wrong and what the alternative is. Episodes 3, 4 and 5 are now released on our YouTube channel and episode 6 soon will be.