LPPFusion Report
January 22, 2020

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Wefunder Campaign Extended to March 1

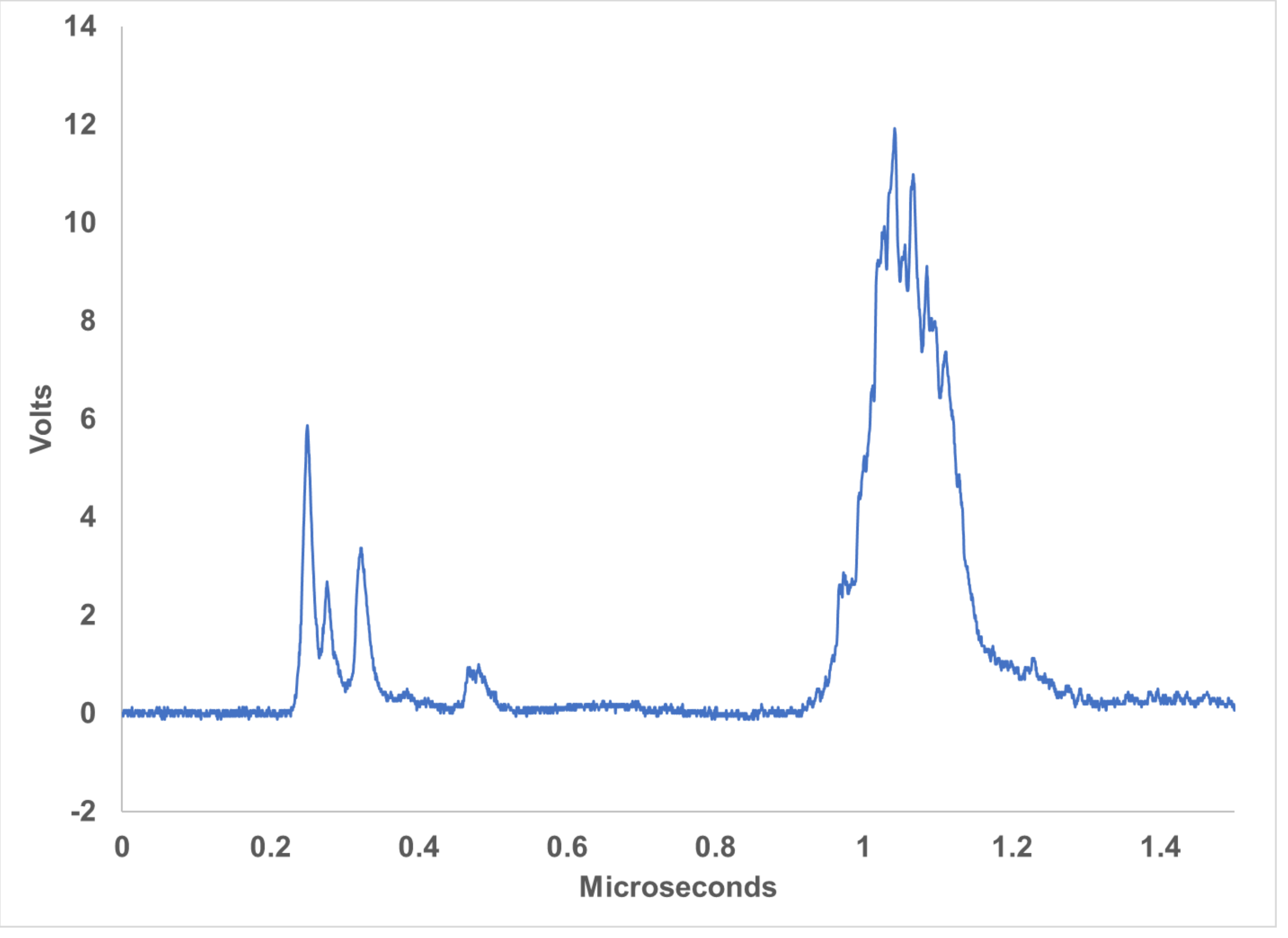
We've just completed our third successful financial audit. Because of this we can now extend our Wefunder campaign through March 1st. Without this audit, SEC regulations limited us to ending the campaign 120 days after our fiscal year ended, which is Jan 31st. We are happy that we can stretch this campaign a little bit longer. So far, we've raised $395,000 from 165 investors. We need to raise only $5,000 more to reach our minimum goal of $400,000, but we hope to go way beyond this in our final month. Thanks to everyone who has invested or is considering doing so.

X-rays Show: FF-2B's Best Shot is All Hot!

The latest data from LPPFusion's lab shows that *all* the plasma in our tiny fusion plasmoid is **hot**, not just some of it. Hot in this case means 600 million degrees K, sixty times hotter than the center of the sun. This new result shows that our results are being fairly compared with those of other fusion approaches and that we really do have the *hottest confined plasma in the fusion race.*

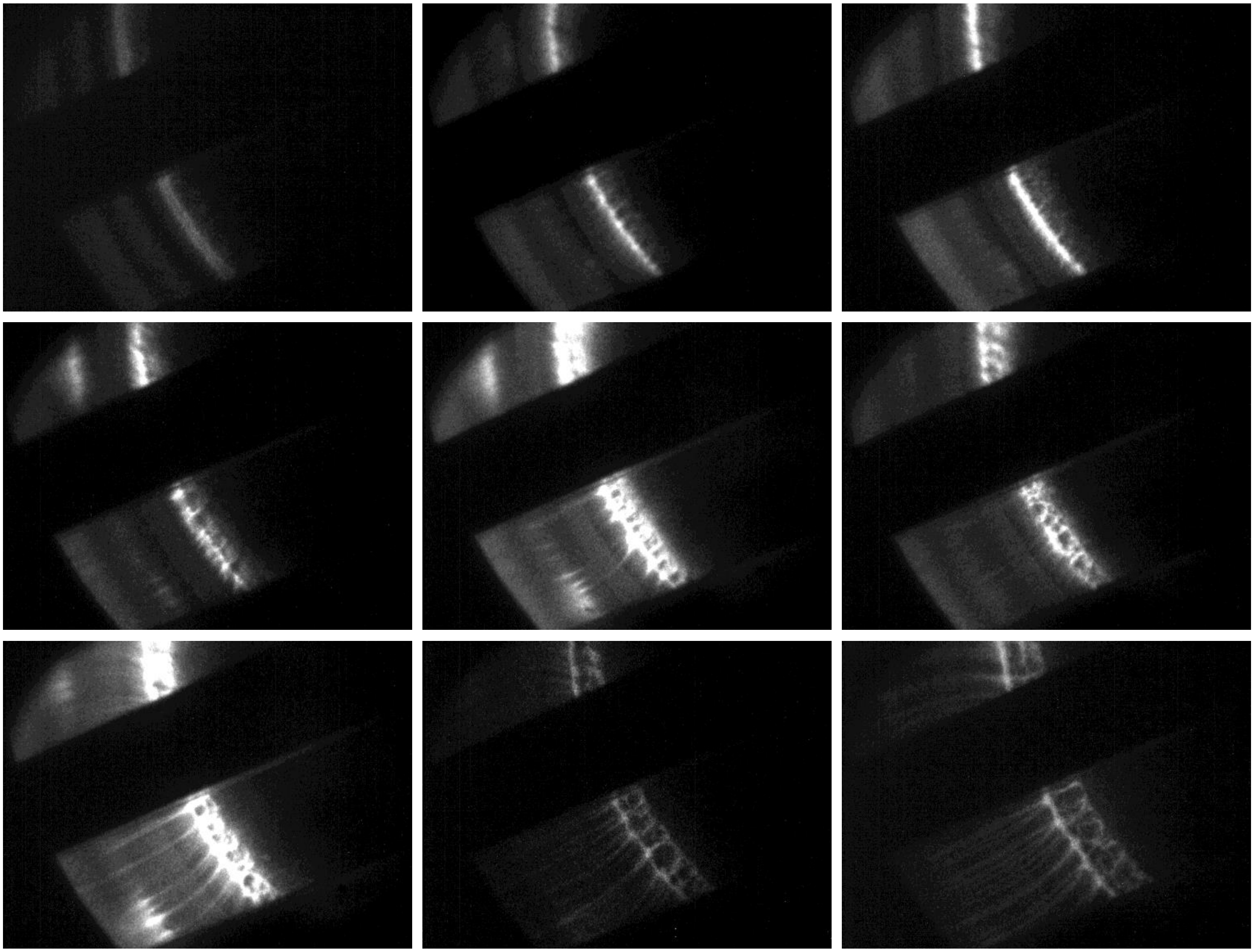
LPPFusion published in 2017 results that showed our device FF-1 had achieve the hottest confined ion energy of any fusion device—energy equivalent to a temperature of 2.8 billion K. However, some critics questioned if **all** the ions were this hot, or if there was a hidden background of cold plasma. In this alternative, a small number of hot ions in our plasmoid were colliding with a large number of cold ions to produce the fusion reactions we observed. So, critics argued, our record did not really reflect what was going on inside the plasmoid that produced the fusion reactions. (These critiques were never published, but were conveyed to us in conversations.)

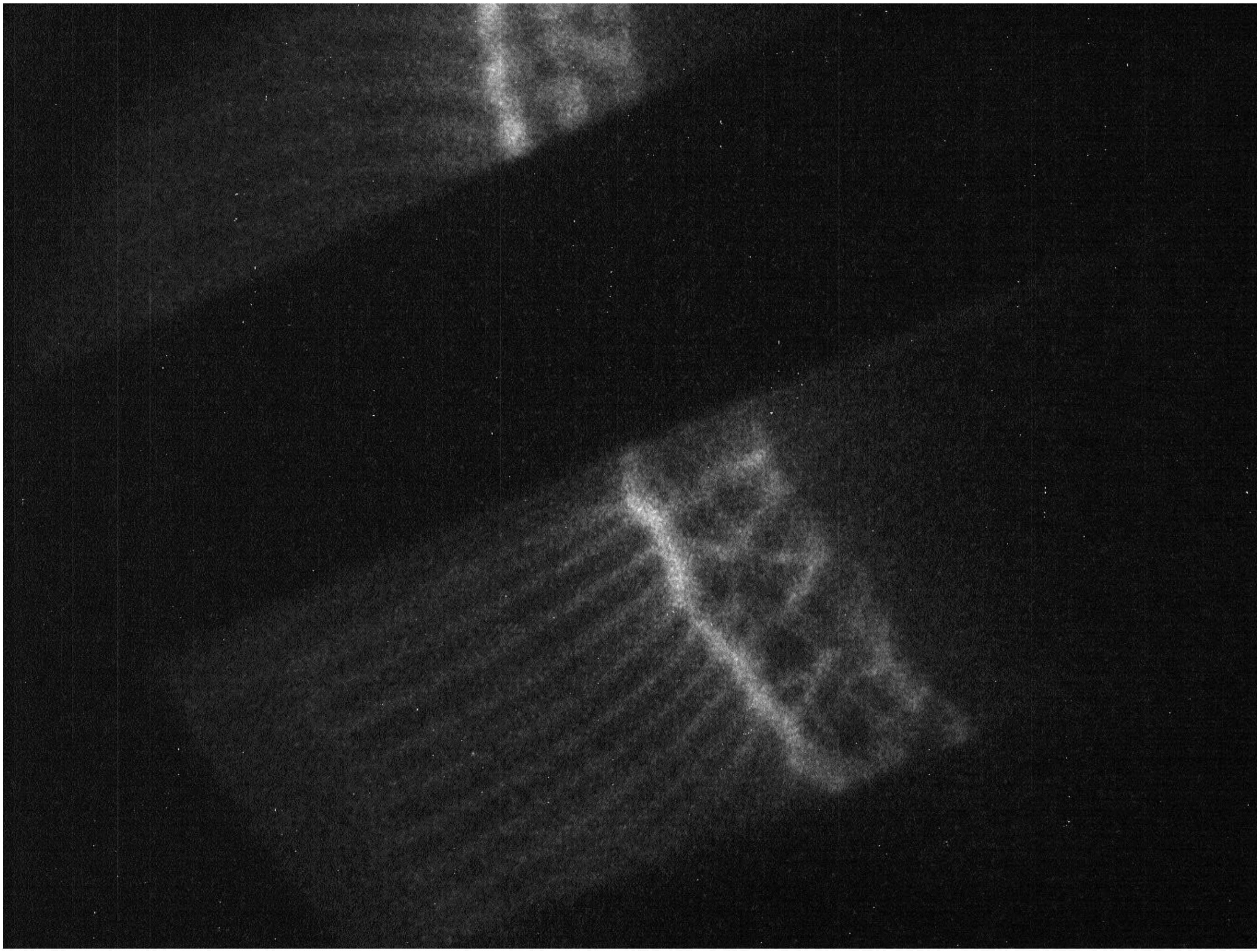
The new X-ray data that we analyzed this week rules out this cold-plasma idea. X-rays are emitted when hot electrons collide with any ions—hot or cold. So, the quantity of X-rays emitted measures the *total* number of ions (charged atoms) present in the plasmoid. At the exact same time, we are measuring the number of neutrons produced by fusion reactions, which are a measure of the number of *hot* ions. By measuring the ratio of neutrons to X-rays (and correcting for temperature and other factors) we can measure the ratio of the number of hot ions to the number of total ions.



When we did this for our best shot so far this year, shot 1 of October 21, we found that while the neutrons showed 0.125 J (watt-sec) of fusion energy was released, only 0.035 J of X-rays energy was emitted. (See the graph—the big peak on the right is from the neutrons and the small peaks on the left are from the X-rays. The third peak from the left was produced when the fusion reactions took place. The horizontal axis is time in microseconds. Neutrons travel much slower than X-rays, so arrive at our instrument later.) Based on this ratio, we calculated that the number of hot ions is the *same* as the number of total ions, with a 15% error margin. So, at least for this shot, there's no room for cold plasma—it is *all hot*. We'll soon be doing the same analysis for all shots we take.

Images Catch FF-2B in Action





These new images from inside our Focus-Fusion-2B experimental device show the development of the filaments of current (bright thin parallel lines) in the early stages of each pulse. The filaments are a crucial step in compressing and heating the plasma to get fusion reactions. The images, taken with our ICCD camera using an exposure time of only 5 ns (billionths of a second) show the current sheath moving down the anode (towards upper right) as viewed between the cathode vanes (diagonal black bands). The top-to-bottom size of the images is 2.5 cm.

They show the development of the sheath from 230-570 ns after the current starts flowing. The key positive features of the images are that the filaments (running from lower left towards upper right) are evenly spaced and thin—only 200 microns in radius. Those characteristics should lead to a dense plasmoid and rapid fusion burn. But the images also show the challenge that we currently face—the front (right) edge of the sheath is not a single, sharp line, but two separated fronts. This is caused, we know, by the oscillation in current that produces an early small pulse of current, followed by a bigger one. In the region between the fronts the filaments are twisted and disorganized. This leads to poor compression and less fusion. However, we are working hard to eliminate the oscillations so there is a single front and the filaments will be neatly organized all the way to the front of the sheath. In the past three months, we have achieved significant progress in greatly reducing the oscillations, but have not yet reached the threshold for a new increase in yield.

These images are produced from 10 separate, but very similar, shots. The flickers in brightness are caused by changes in camera filters and sensitivity—the real brightness is steadily increasing during the time covered as the current flowing through the sheath increases.

New Video Series on Crisis in Cosmology

LPPFusion has launched a new video series titled "The Real Crisis in Cosmology—The Big Bang Never Happened". In this new series of monthly videos, LPPFusion Chief Scientist Eric J. Lerner will explore the scientific evidence that the dominant model of cosmology is invalid. Instead, the basic phenomena of the cosmos can be understood without an origin in time for the universe, and without exotic hypothetical entities like inflation, dark energy and dark matter. In the first episode of the series, Lerner focuses on the new work he presented at the January, 2020 meeting of the American Astronomical Society showing that the Big Bang theory of the origin of light elements has been increasingly refuted by data on the abundance of both lithium and helium.