
SAFIRE
PHASE ONE

SAFIRE

Note: all photographs of experiments are exactly as seen by the eye, no Photoshopping has been done.

PHASE ONE

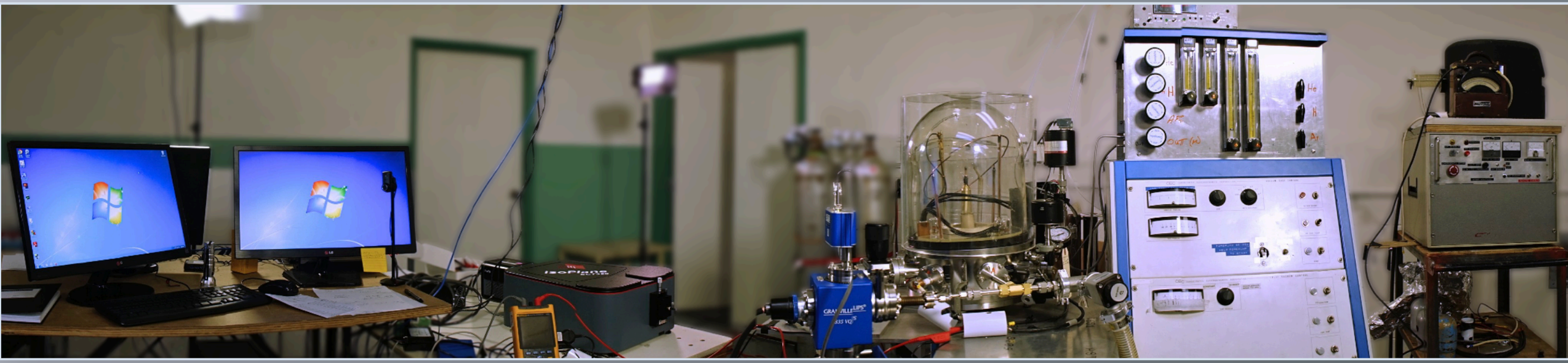
Anode

Proof of Concept: Bench top testing

The Sun’s atmosphere is a stable plasma existing in the vacuum of space. The SAFIRE apparatus had to both create the plasma and gather and store data about its nature and characteristics. These lab data and observations could then be compared with similar data from actual solar observations.

After many conference calls among team members, literature searches, and meetings with vendors, a design was completed, lab space rented, equipment bought, borrowed, rented, and in early 2014 a small apparatus was constructed.

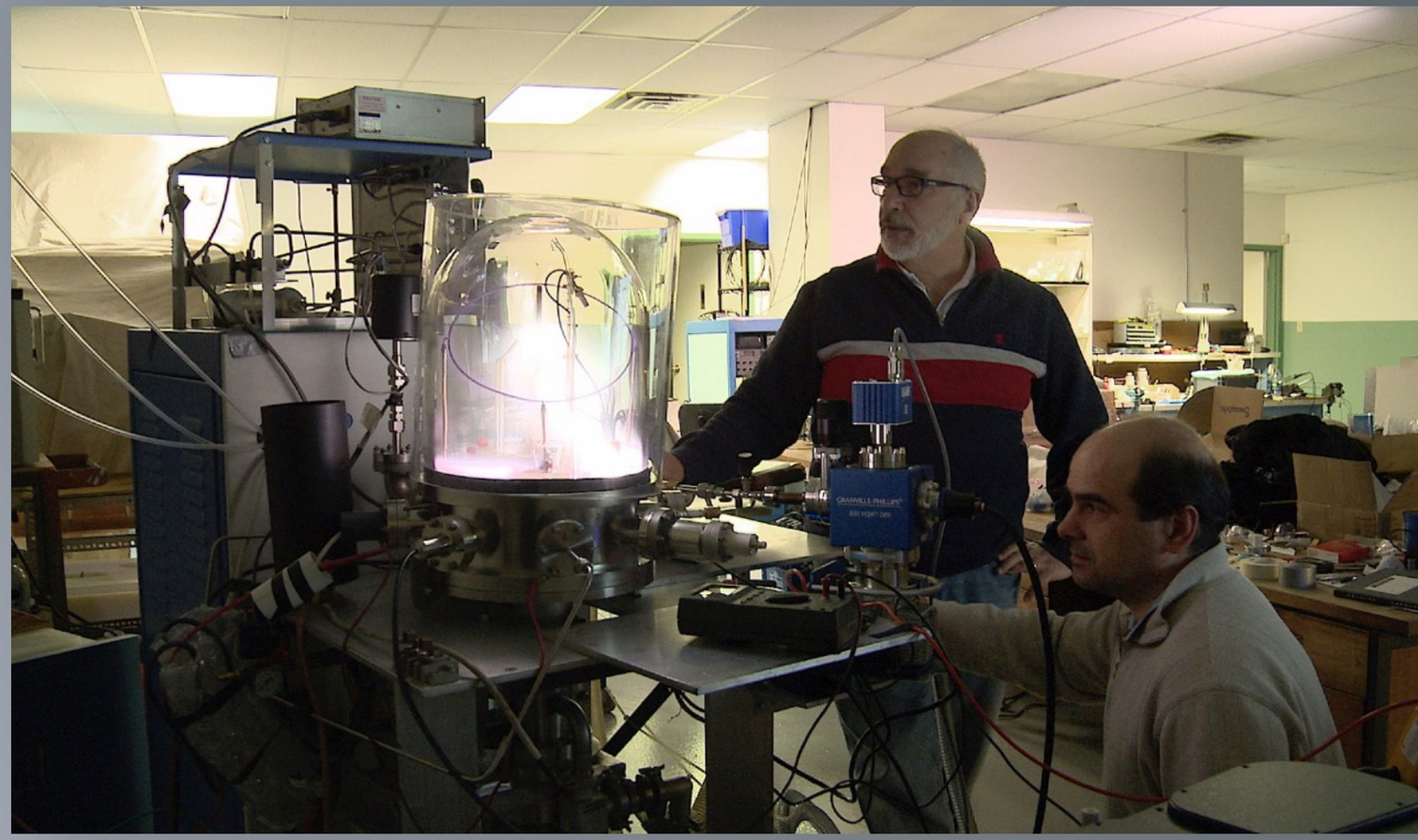
Michael Clarage, Montgomery Childs, Wal Thornhill, Paul Anderson at the University of John Hopkins



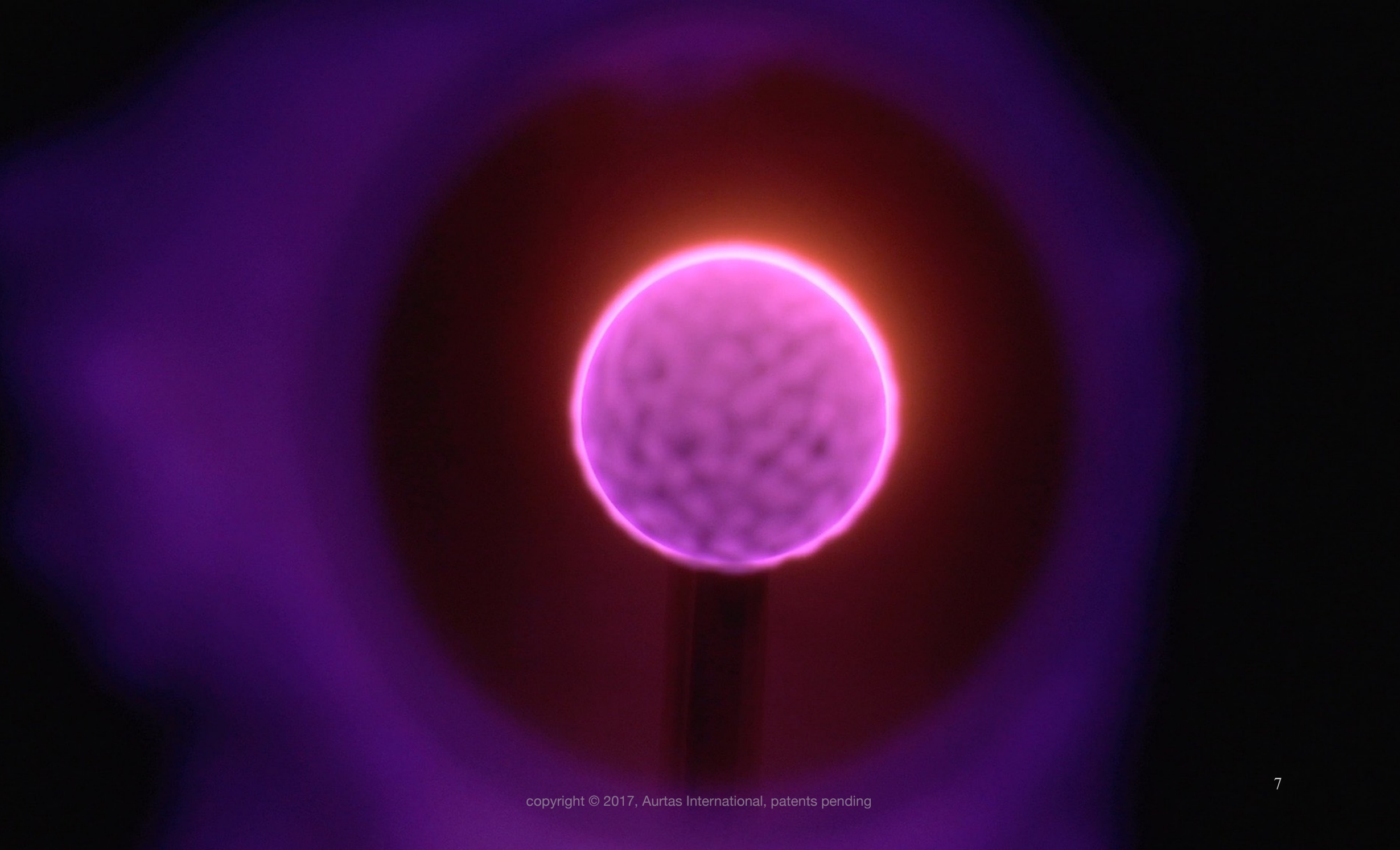
Phase I Lab with small bell jar to the left of the gas / vacuum control console

It consisted of a spherical metal anode; a variety of interchangeable copper cathodes inside a glass bell jar; pumps to create the vacuum; and an 1,800-watt direct current power supply to provide power to the anode. High speed and still cameras; an oscilloscope; and both an optical and a mass spectrometer would gather data.

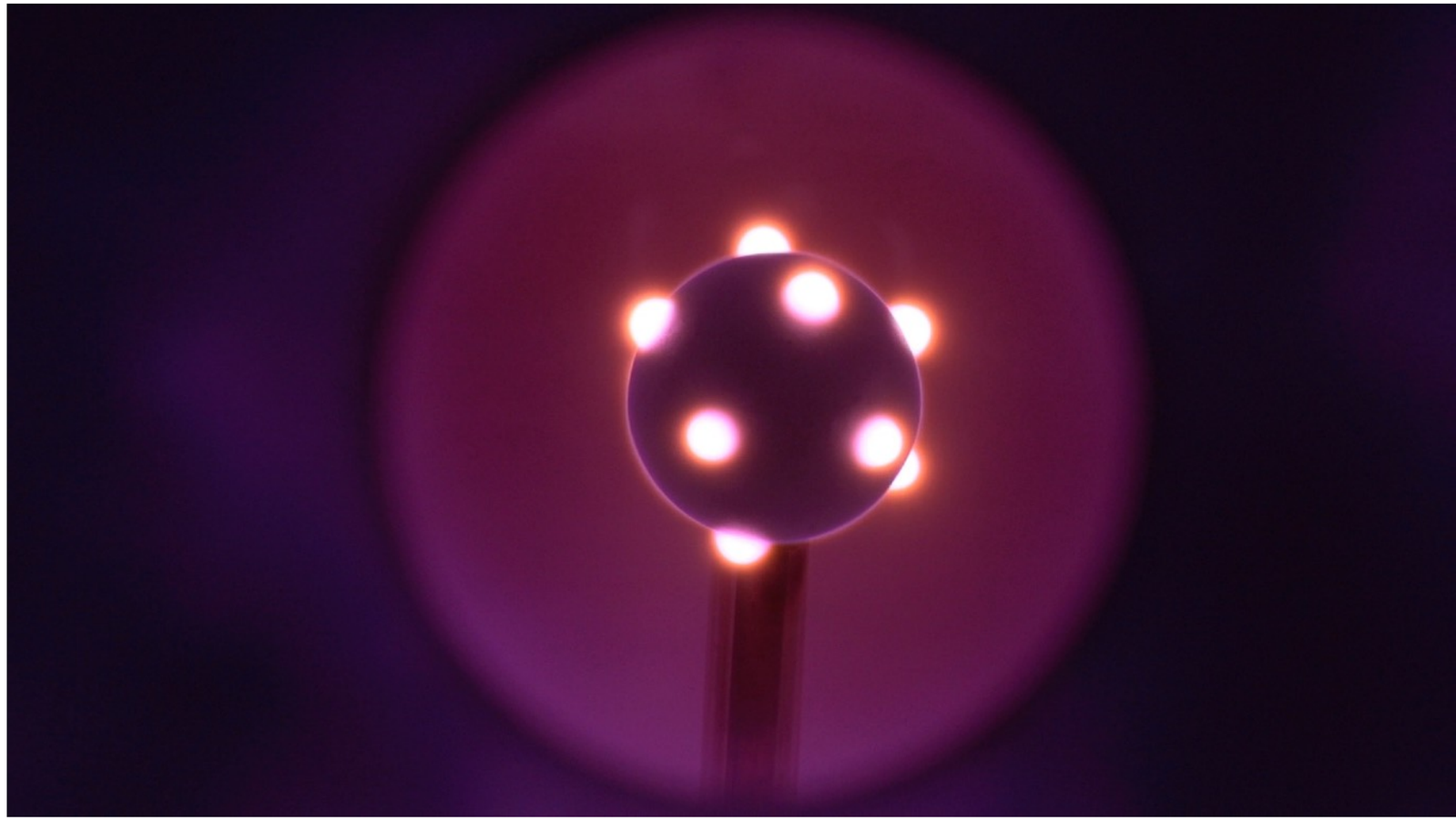
The prediction was that this rather simple combination of a positively charged anode in a negatively charged environment would produce a spherical plasma around the anode. And, it did just that.

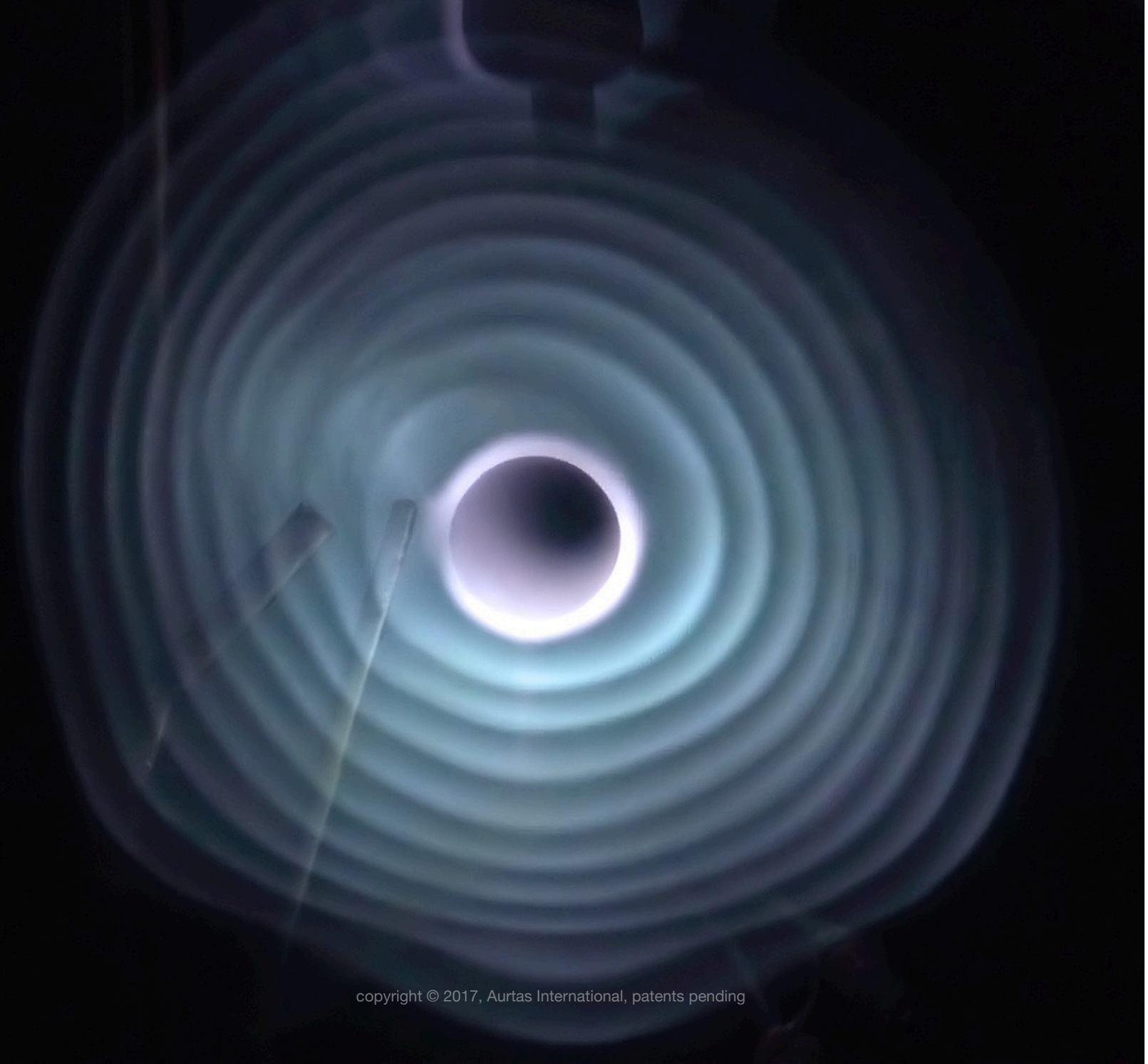


Montgomery Childs and Jan Onderco working with first proof-of-concept bell jar setup.



The first evidence of plasma phenomena were small, round tufts appearing on the surface of the anode. The tufts were in constant motion as they sought to maintain an equal distance from one another. Their numbers multiplied as the electric current supplied to the anode increased. When new tufts materialized in an empty space on the anode all the tufts jostled for an equidistant position from each other.



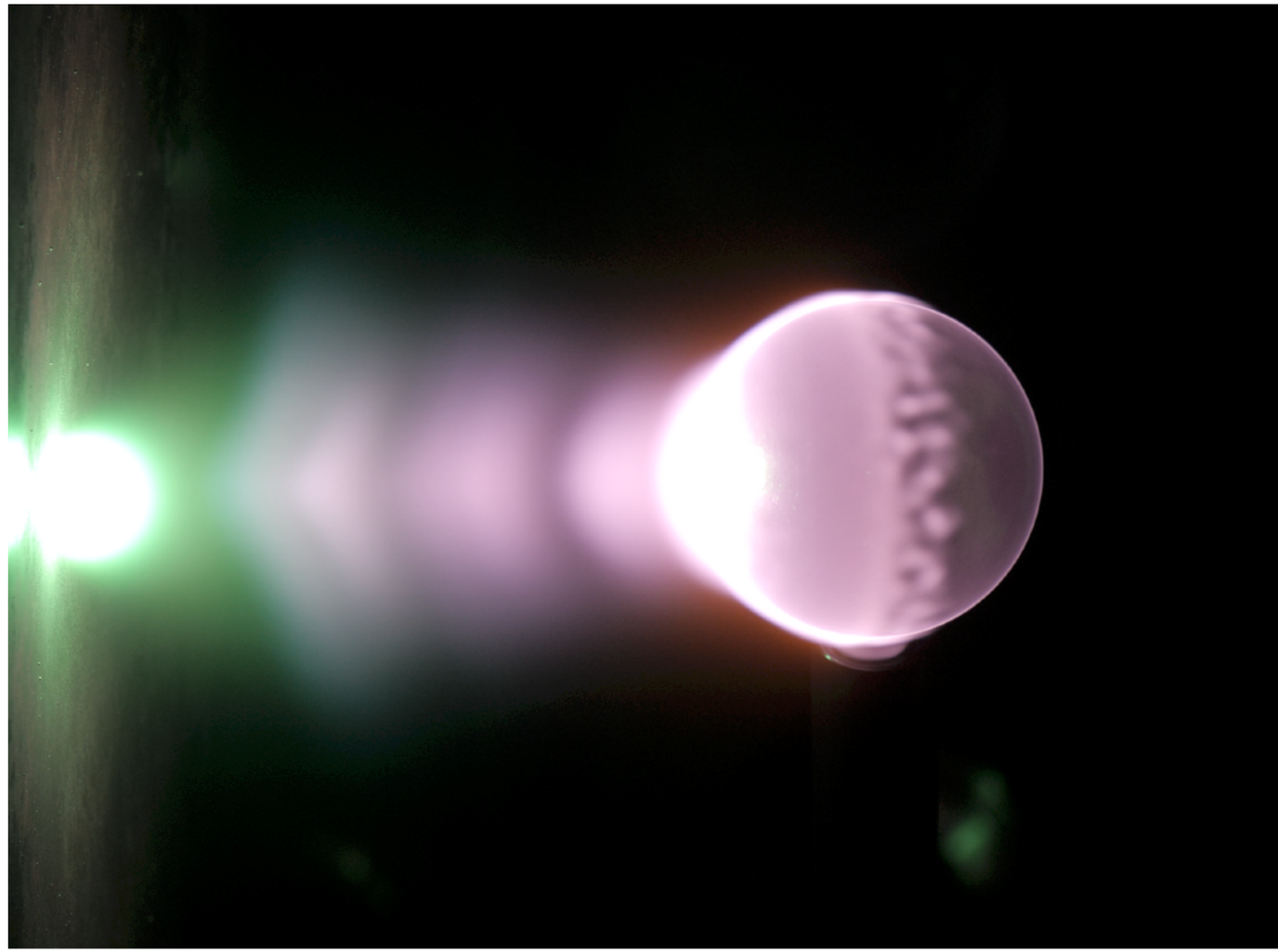


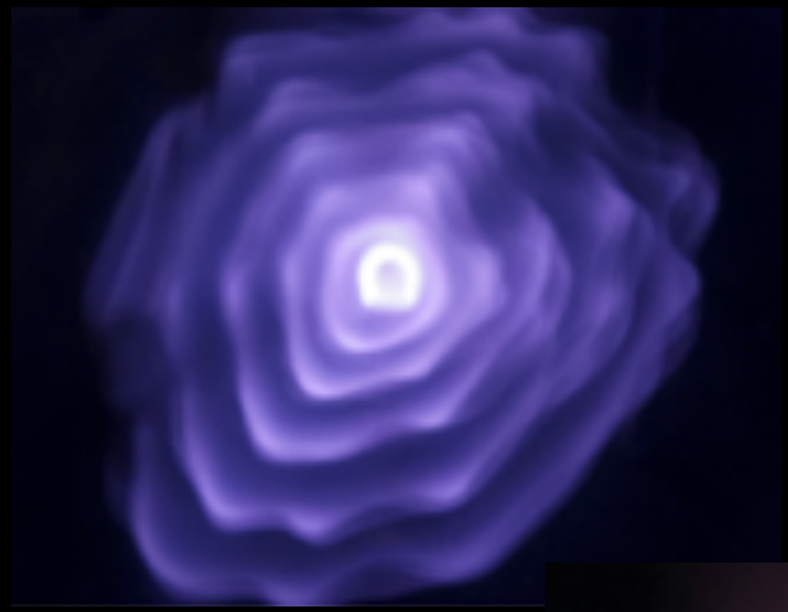
With the addition of power to the anode a spherical plasma shell appeared around the anode, obscuring the tufts. Whether the tufts formed this layer or remained on the anode beneath the dense plasma layer was unknown.

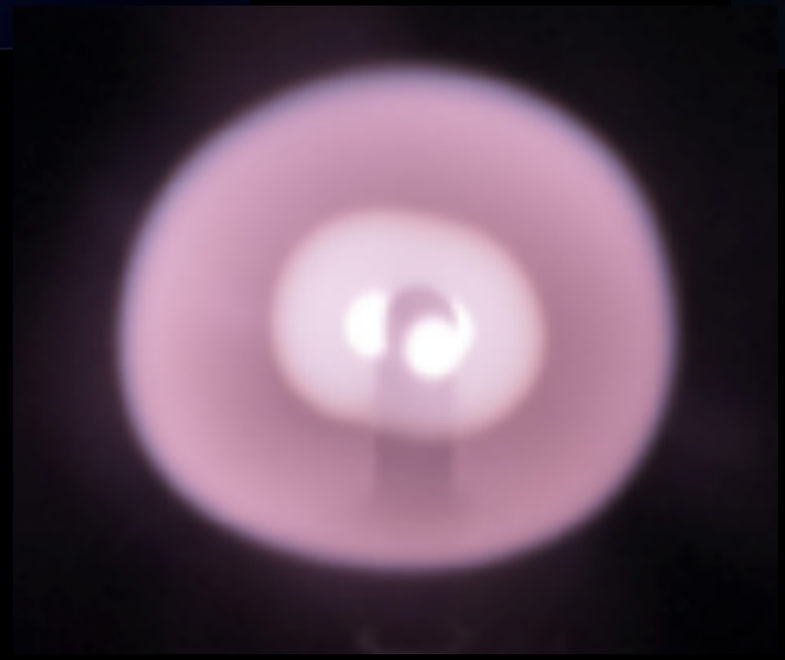
More plasma layers soon appeared around the first – forming many onion-like spheres. Each of these spherical shells had a distinct color and rotated independently of the others. These shells are known in the plasma physics community as Double Layers, because they have alternating layers of segregated positive and negative charges.

The discovery was made that the plasma double layer shells were self-organizing; and worked as high-energy containment fields for the dense plasma within.

Also measured were sudden, short-lived releases of high energy. Even though the power supply could only input 1,800 watts, the oscilloscope showed transient discharges of 2,000,000 to 10,000,000 watts.

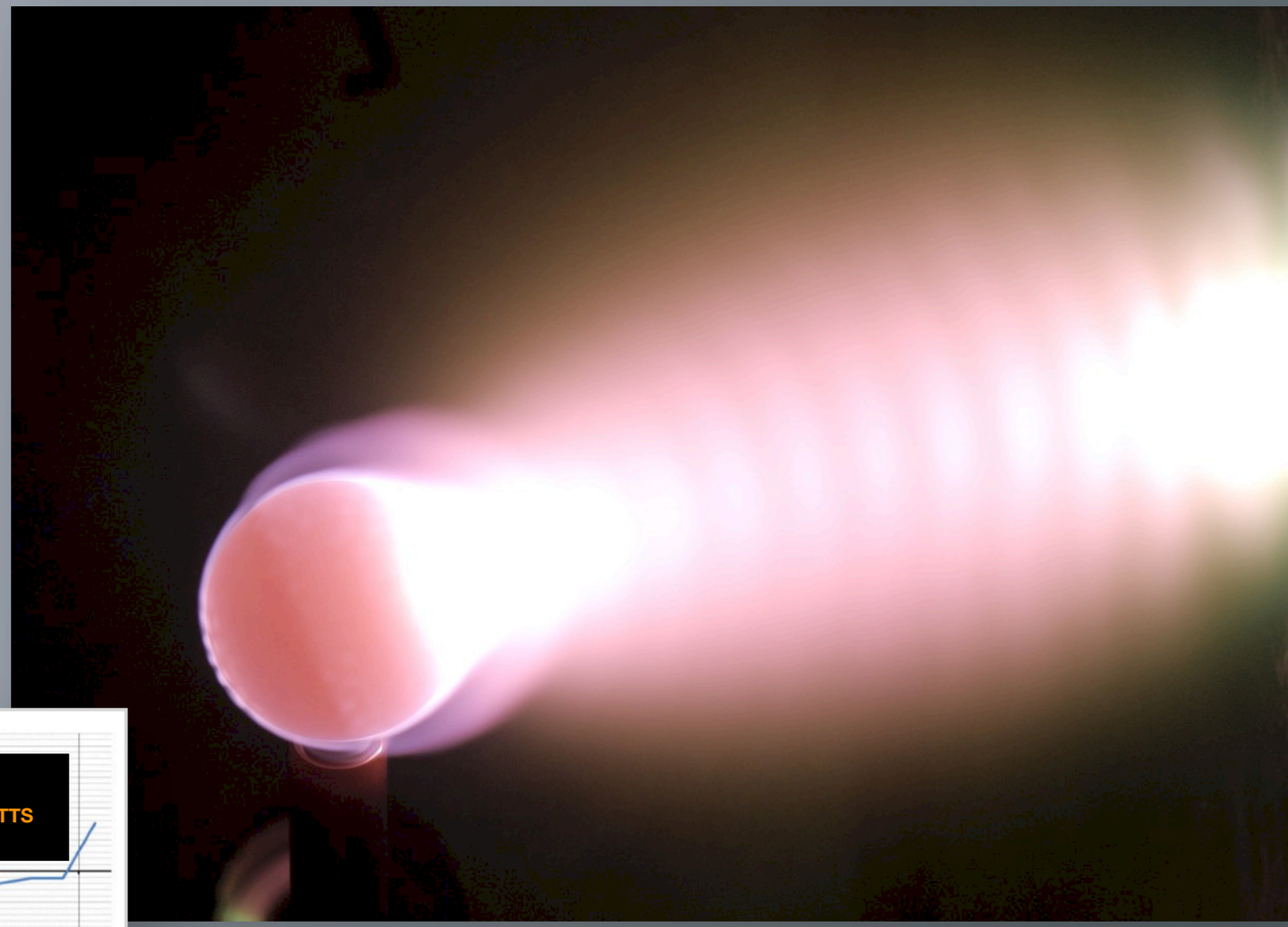


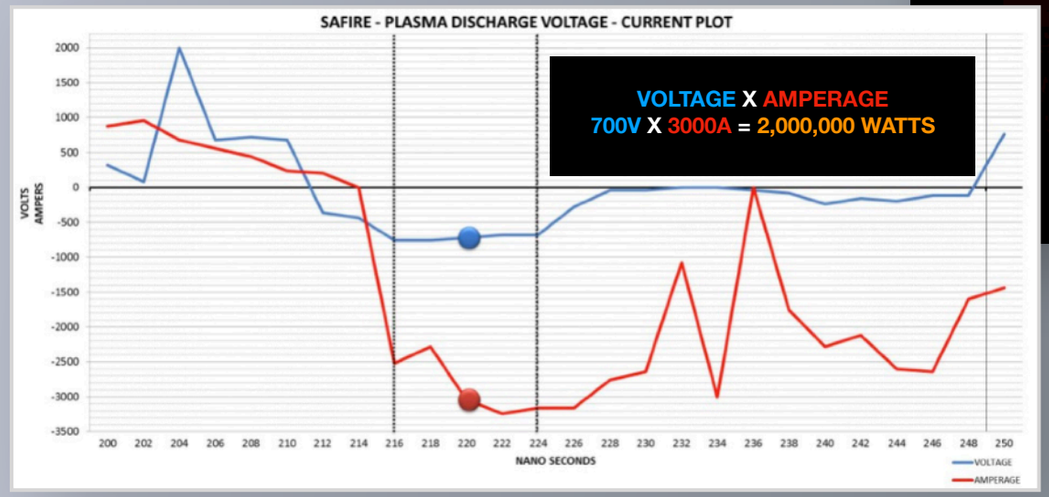


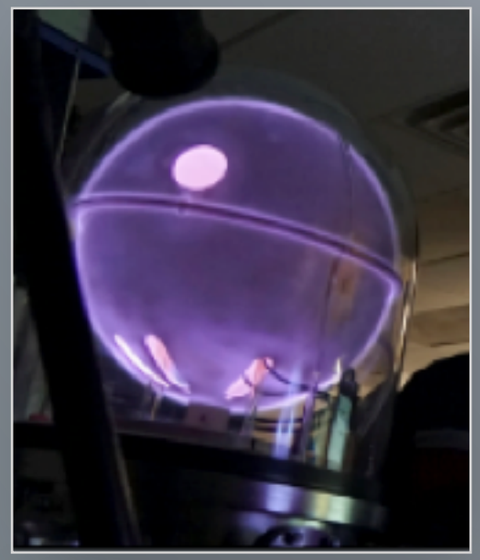


Each of these spherical shells had a distinct color and rotates independently of the others

Experiments revealed that changing the size of the anode or altering the configuration or shape of the cathode did not produce changes in plasma behavior or structure. But if the size of the anode increased, so did the size of the plasma spheres. In either case the same nested spherical double layer shells formed.







Three types of cathodes used during DOE testing

This Phase I apparatus had the capability to consistently produce stable plasmas, but two issues indicated it was time to scale up to Phase II: there was a lack of interior space for diagnostic instruments; and the large amount of heat being produced limited run times and thus required the need for cooling systems.

The bench top had achieved its purpose; a sun-like spherical plasma could be created, sustained within a vacuum chamber, and analyzed in a laboratory.

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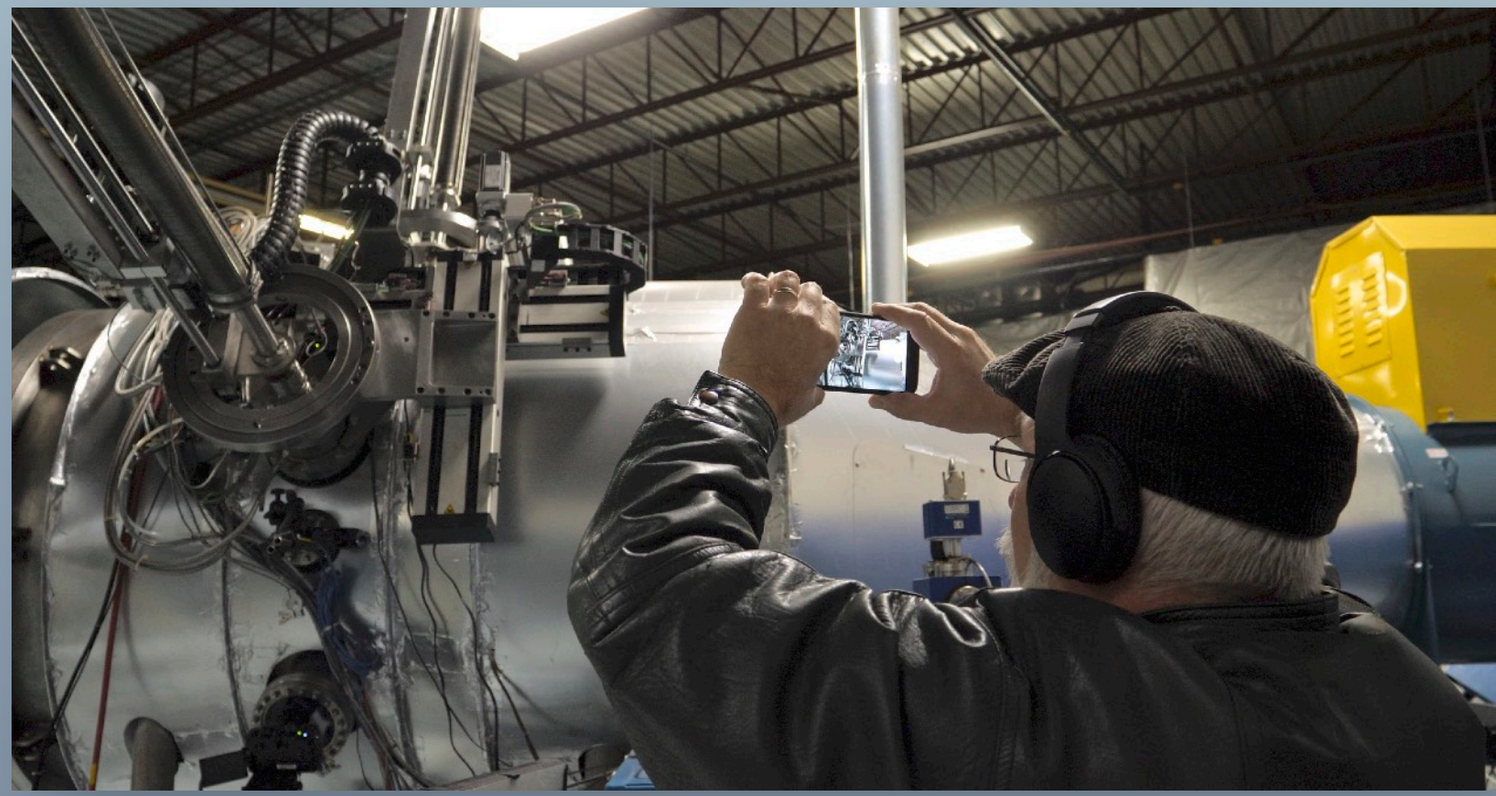

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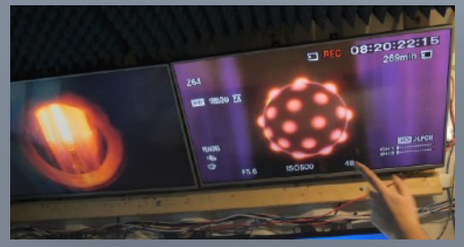

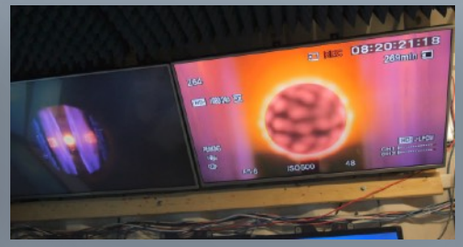

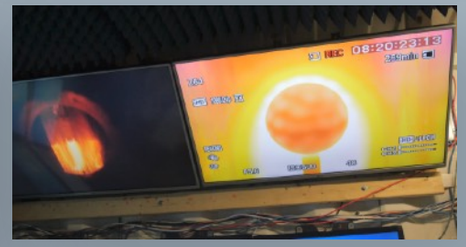

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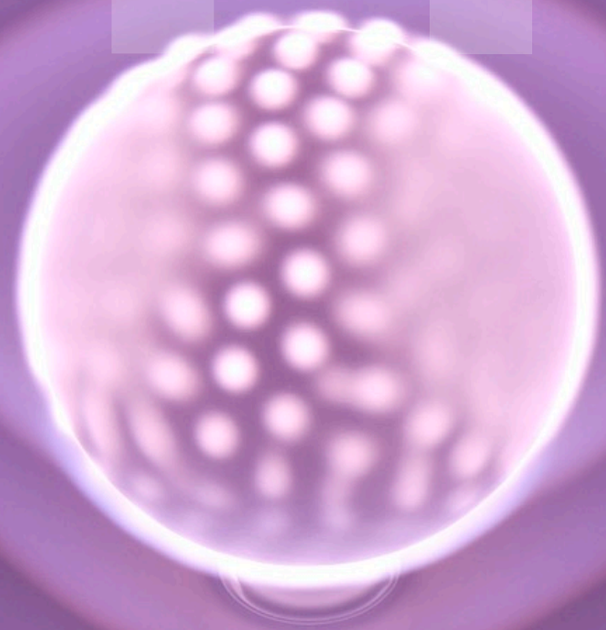

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