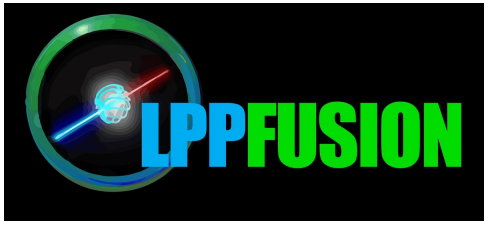
ICDMP 2019
Warsaw, Oct. 4-5

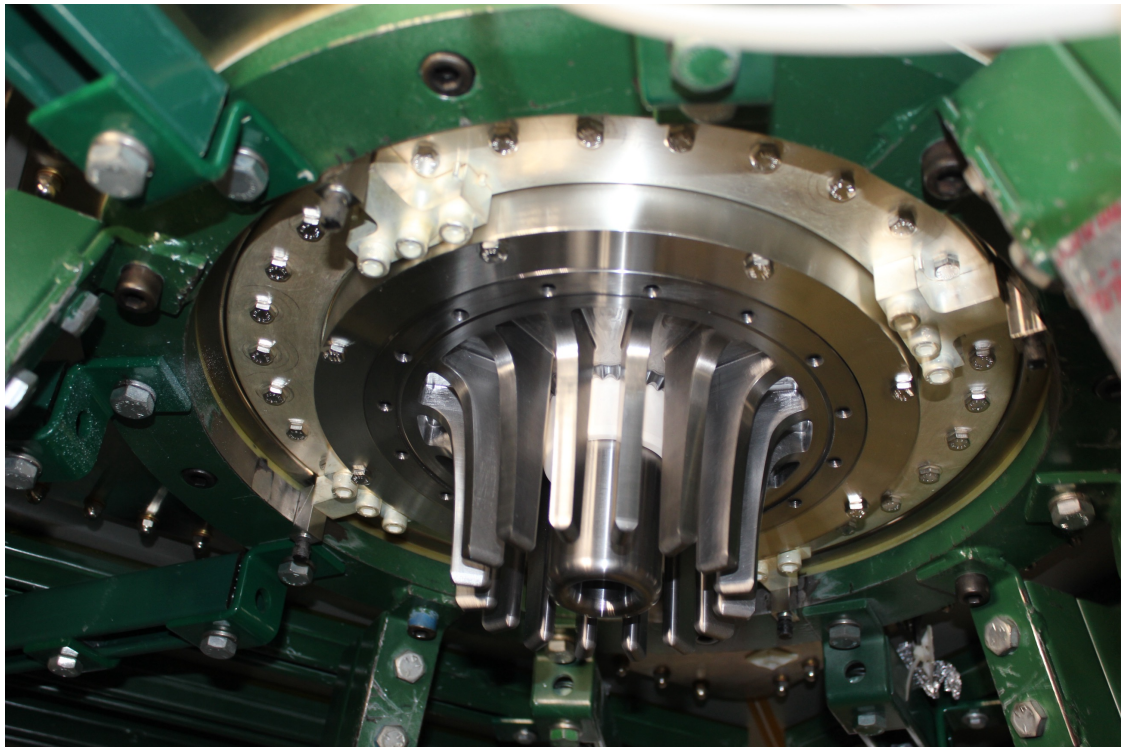



# Progress with FF-2B Device

**Eric J. Lerner**
**Syed Hassan, Ivana Karamitsos, Jose Varela**
**and Fred Van Roessel,**
***LPPFusion, Inc., NJ, USA***

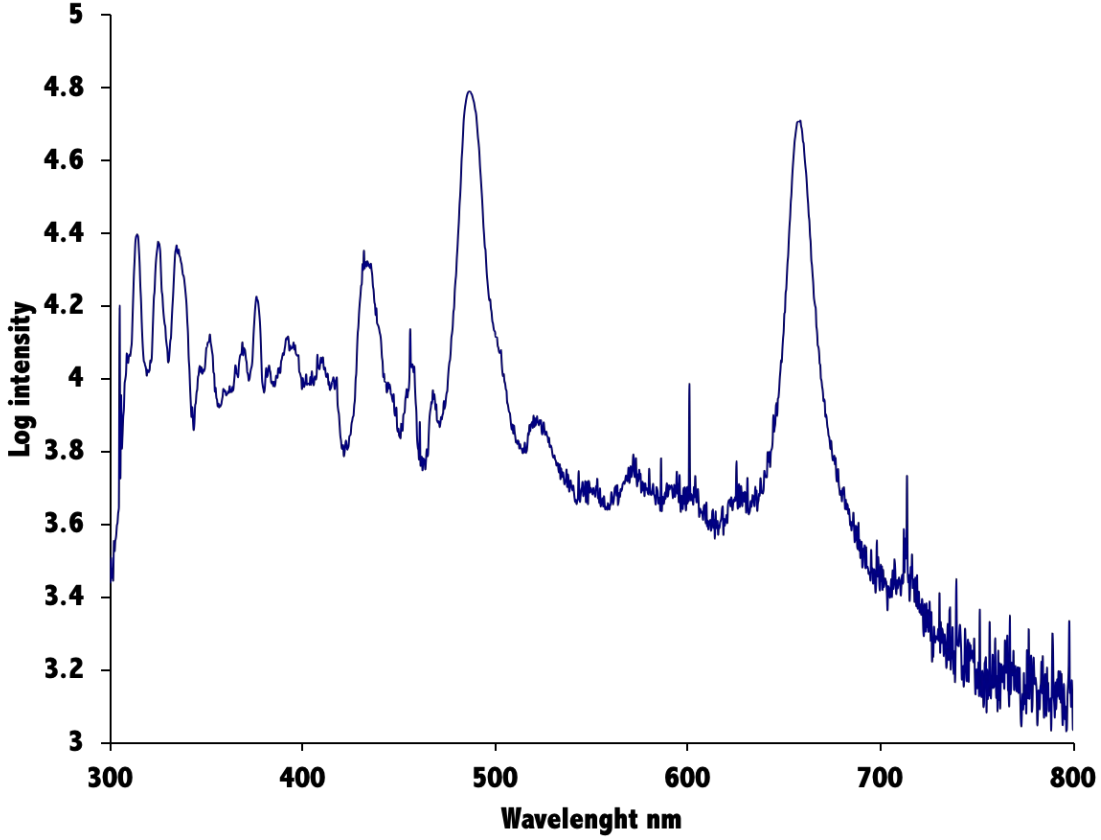
LPPFUSION

# Focus Fusion 2B
# Beryllium Electrodes -10 cm
# Anode Radius 2.8 cm



# First Shot June 4, 2019

# Spectrum Shows Only D, Be and O
# No High-z Impurities Observable



# First Goal Achieved

Low Impurity, Low Erosion Operation of MA DPF

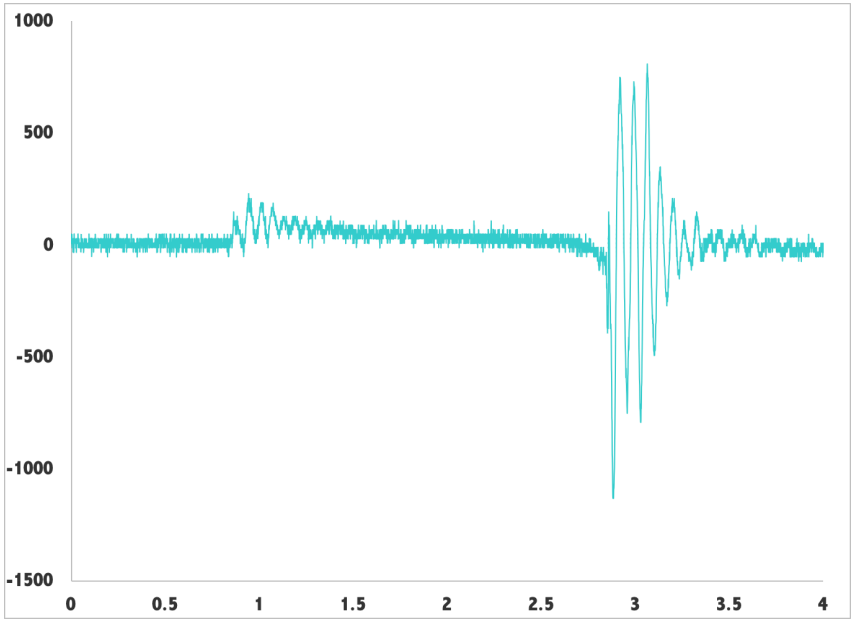
$fz^2 < 0.1$ for all impurities combined

Reduction of Oxygen by 20x

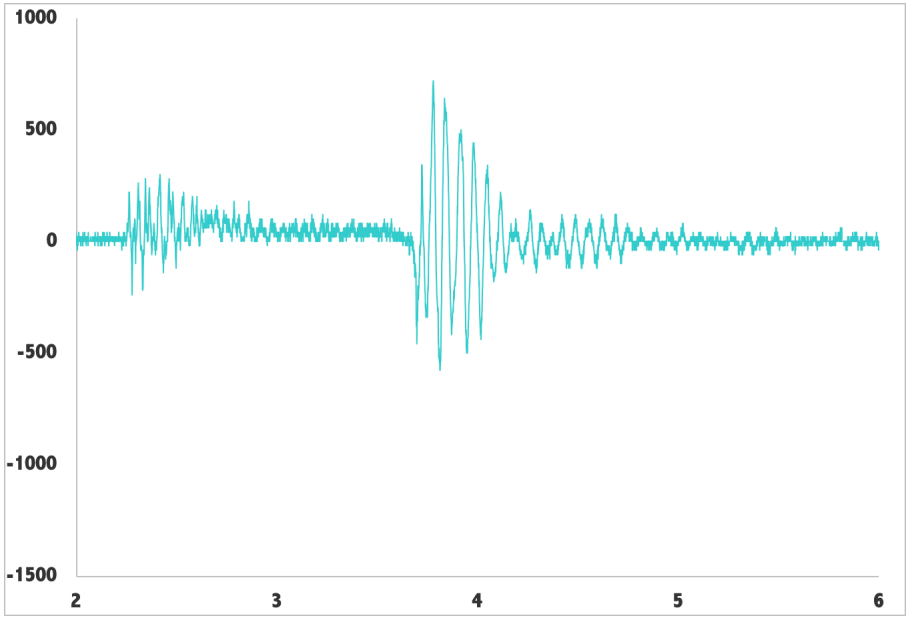
Be erosion 4x less than W by volume, 40 x less by mass,

100 x less $fz^2$ in sheath

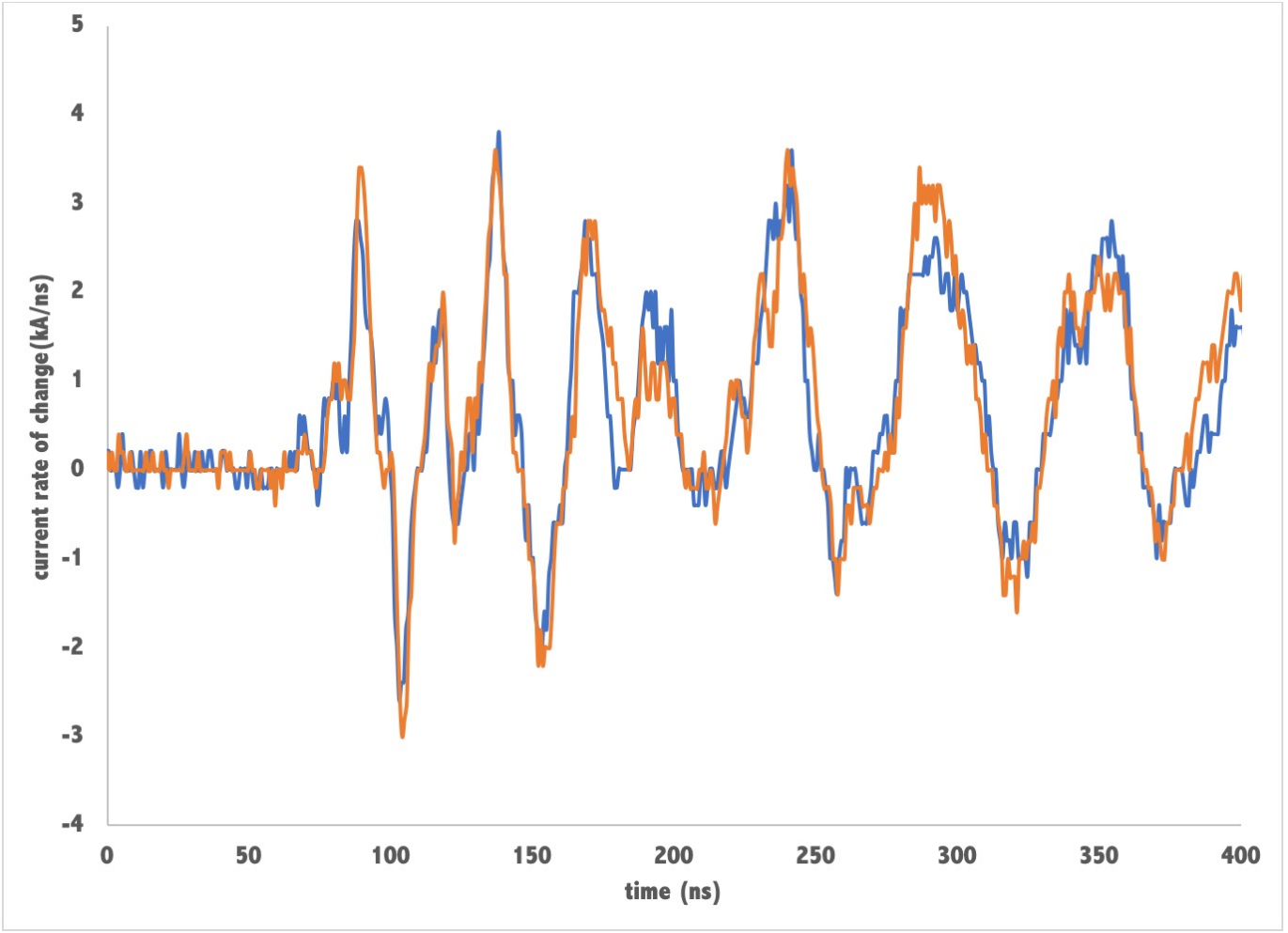
# Preionization with N mix
# Shot 060716-6
# Tungsten



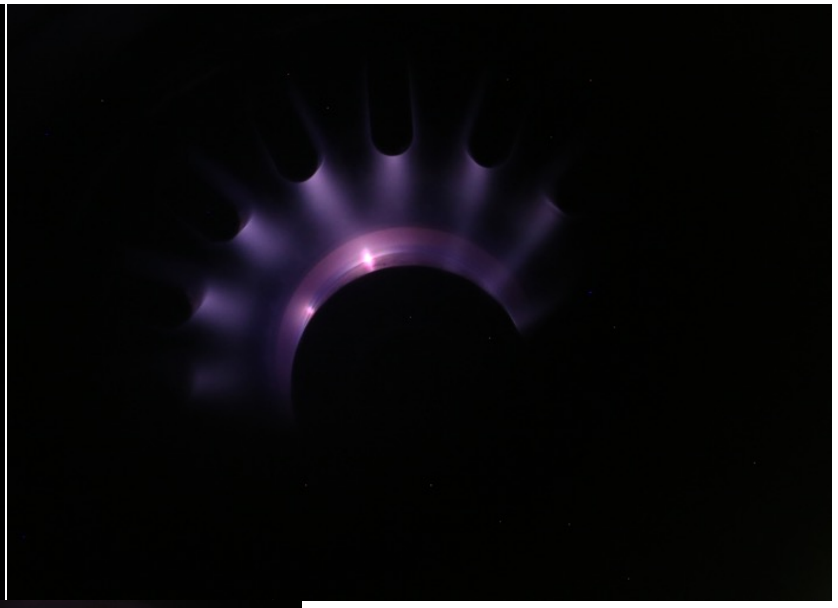

# Preionization with Ne mix
# Shot 070819-6
# Beryllium

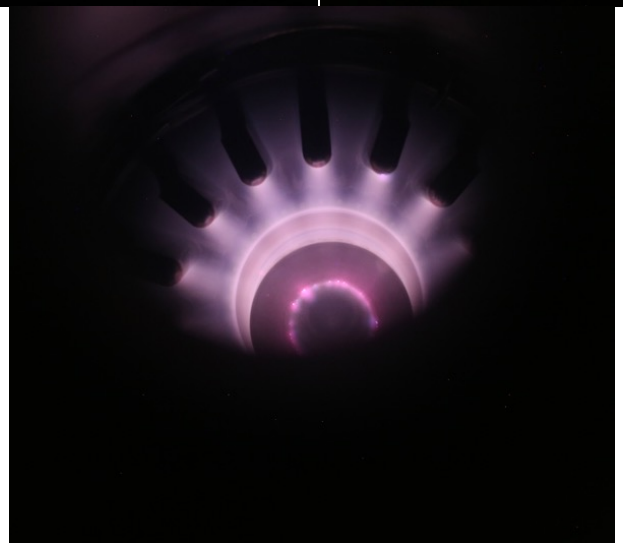


# Oscillations Extremely Stable



# Particles Causing Uneven Breakdown?
# Test With Trigger Alone

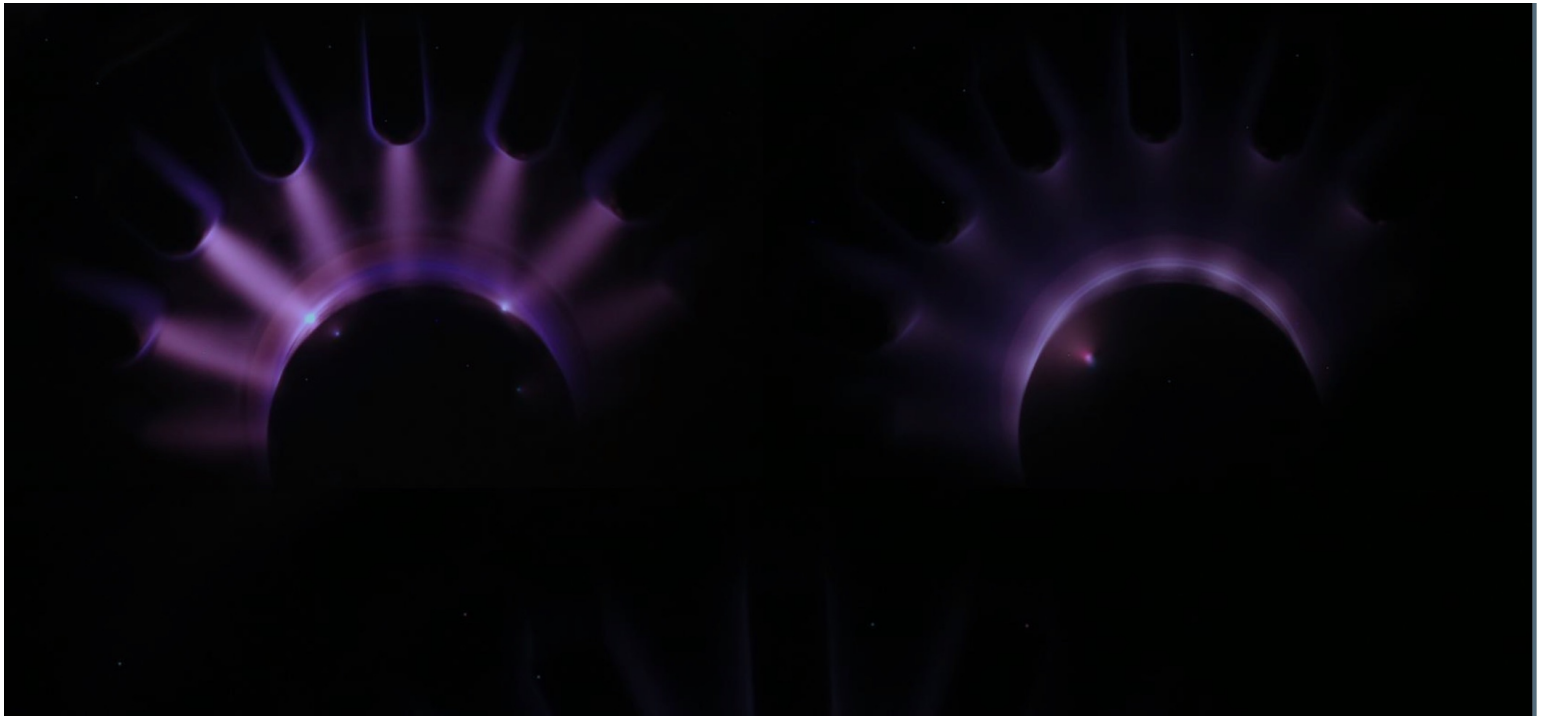




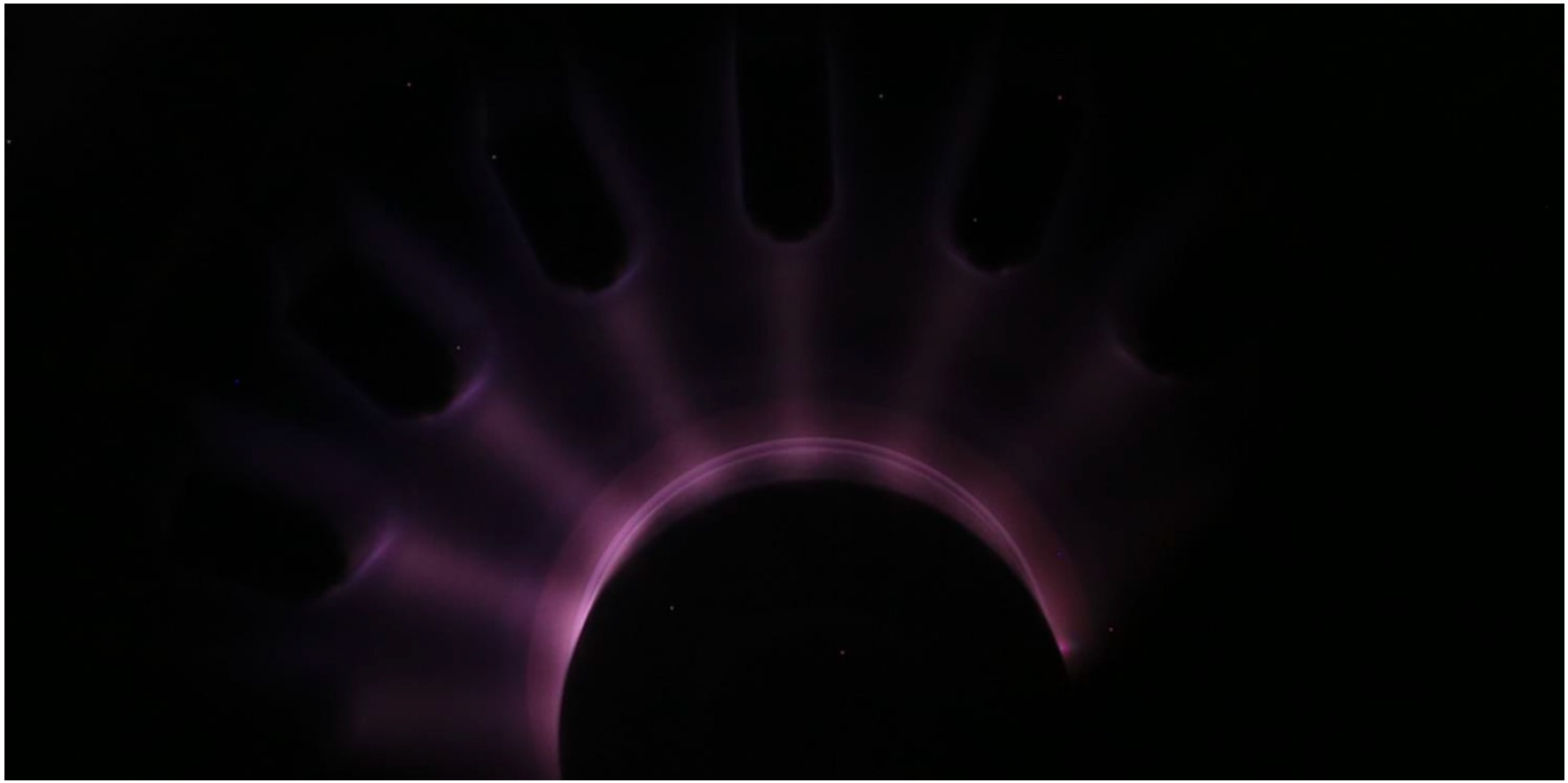
D 16.7 torr
N 0.9 torr

3.8 torr

# D-N Mix Shots Could Move Particles And....

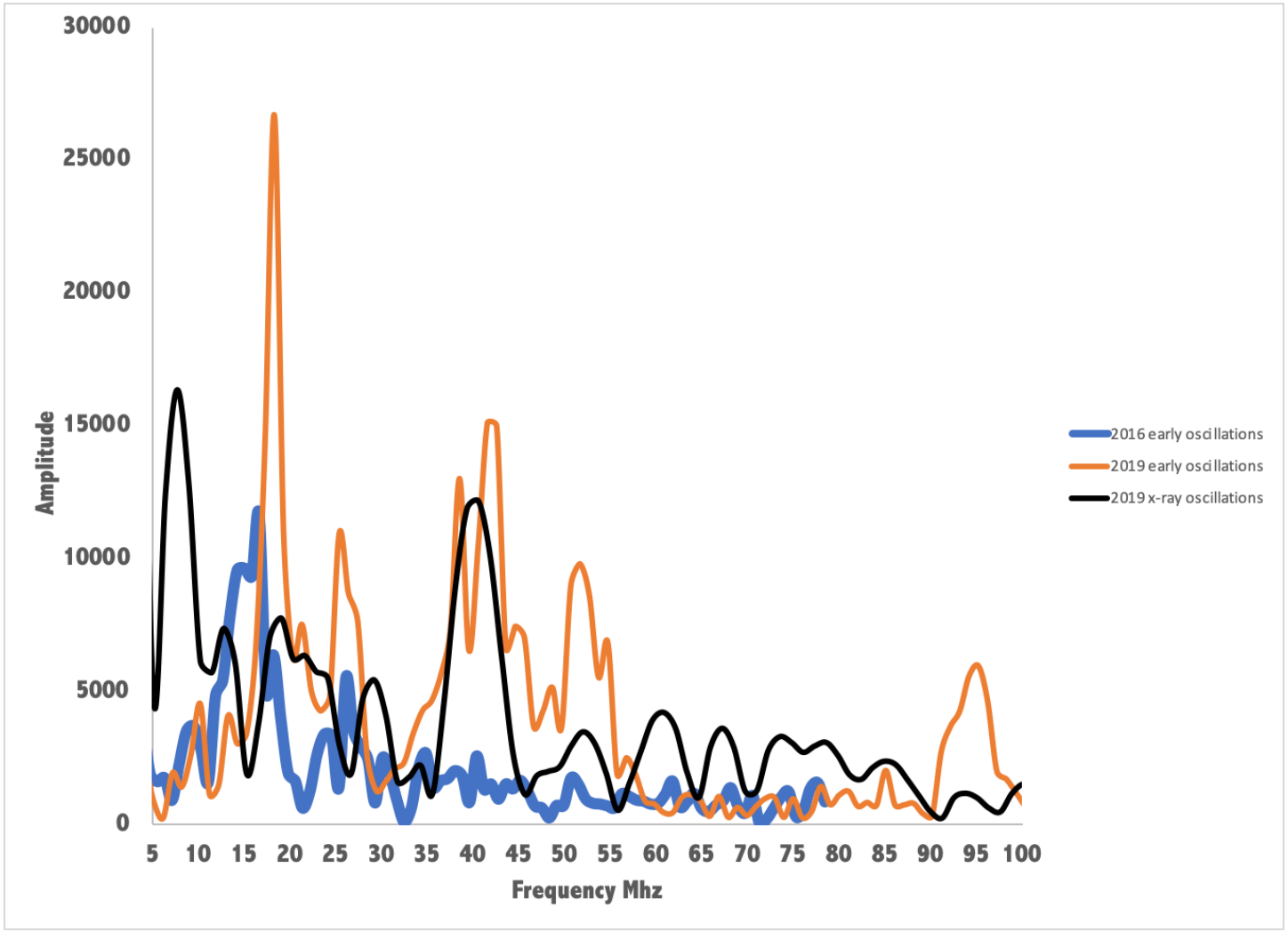


# Sweep Them Away



Aug 27 shots 1-5 , 10-12 torr total ,15-35% N

# But No Change…
# Spectrum Shows 38-40 MHz Peak



# Tracking Them Down

Step-by-step detachment of switches and trigger cables, with trigger pulses to test oscillations showed:

28 MHz oscillations due to trigger cables

40 MHz oscillations due to ground loops between ground plates on device and on floor

38 MHz exciting oscillations due to horizontal breakdown in switches

# Cause and Cures

**Probable cause of much larger oscillations:**

Ceramics reduced spread in switch firing from
20 ns to 4 ns, making switch oscillations in phase

**Cures:**

Adjusting gaps so that one switch on each wing fires
13 ns later than the other

If horizontal breakdown is occurring first, reducing gaps on all switches to make vertical breakdown first, increased pressure

# pB11 Before Year-End

**Plan:** d, H, pB11+H, pure pB11

**To prevent H+B10 yields Be7 (half-life 2 months):**

99.96% isotopically pure decaborane ($600/gm)

Obtained

**C11 production significant—need for dump chamber to allow 8-9 hour cool-down, remote operation**

# Thank You