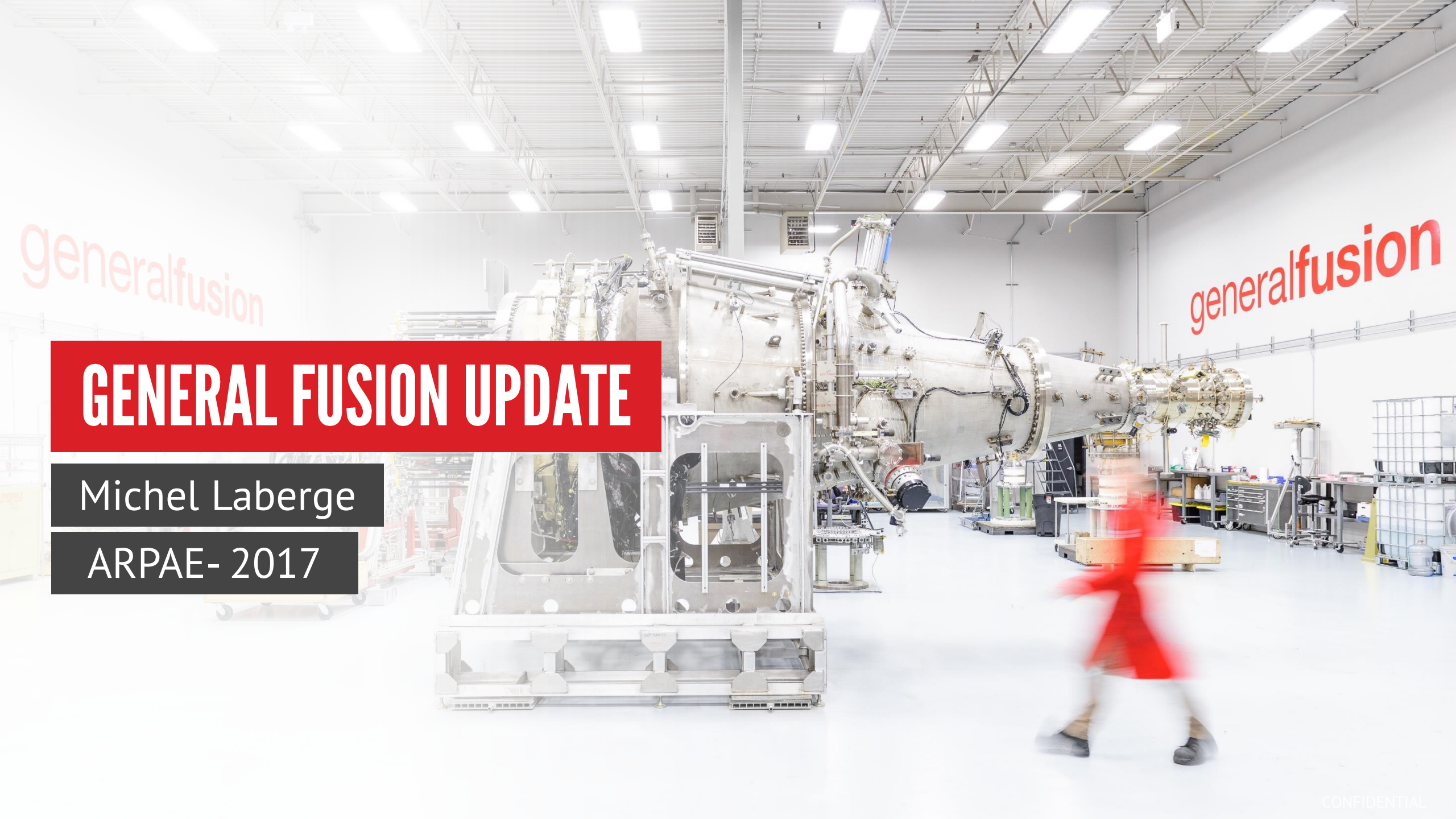


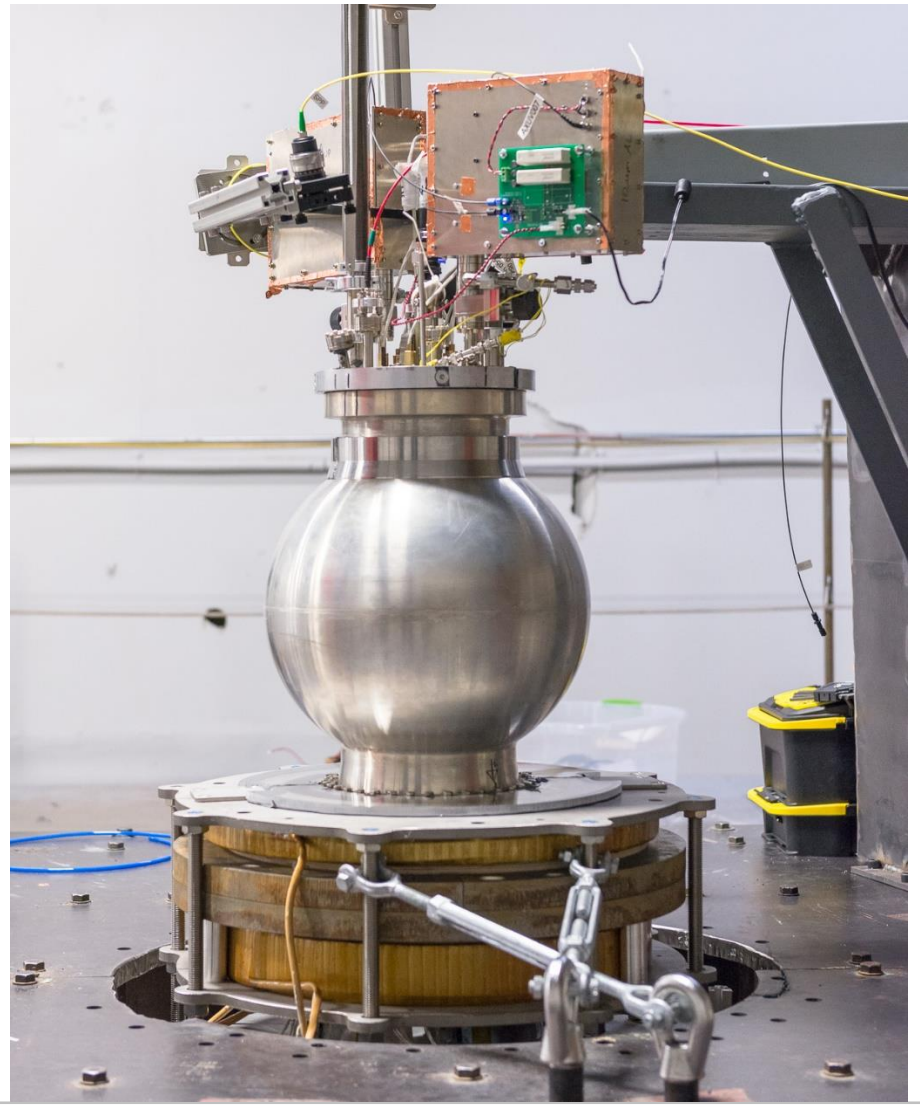
GENERAL FUSION UPDATE

Michel Laberge

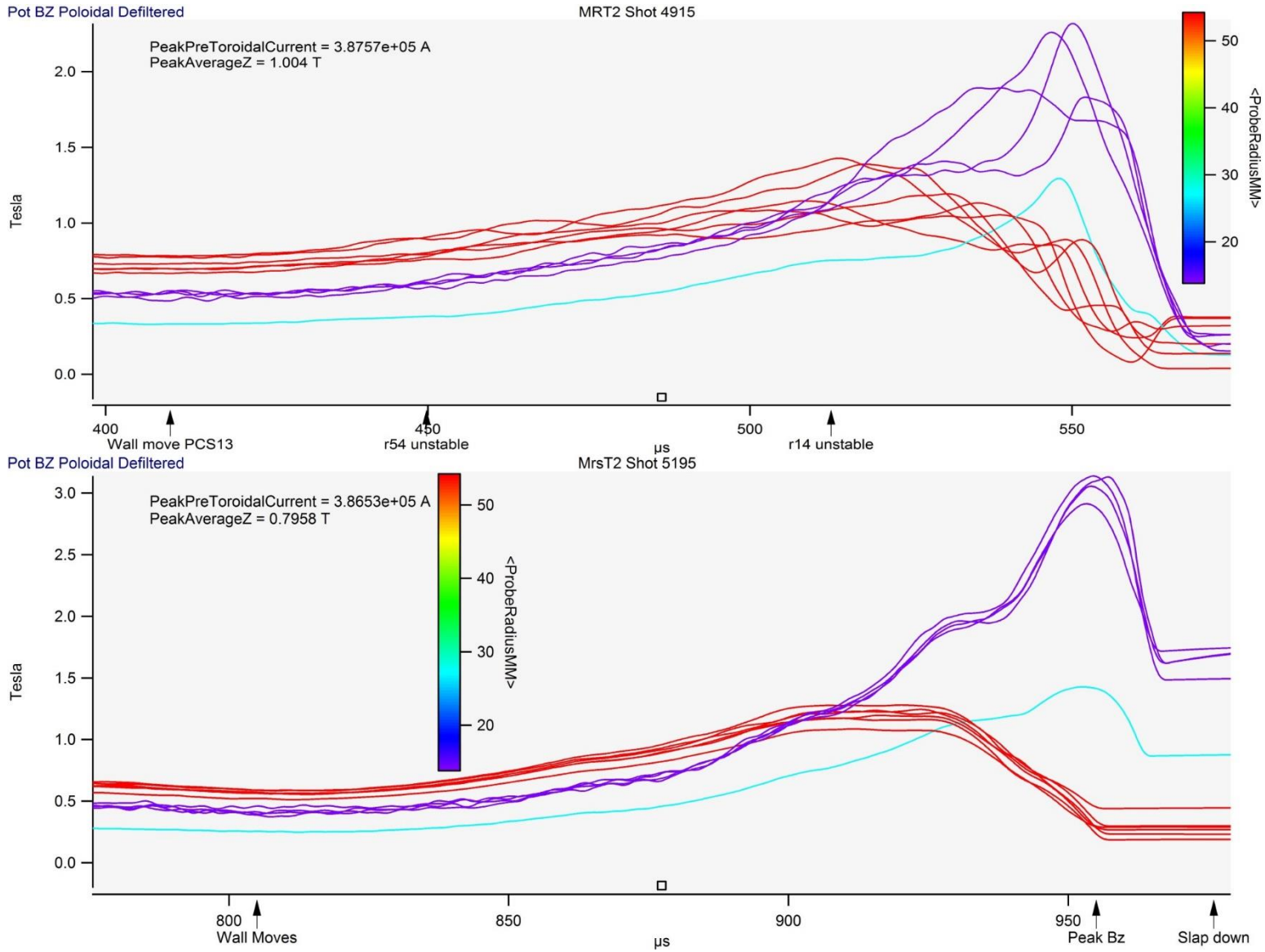
ARPAE- 2017

CONFIDENTIAL

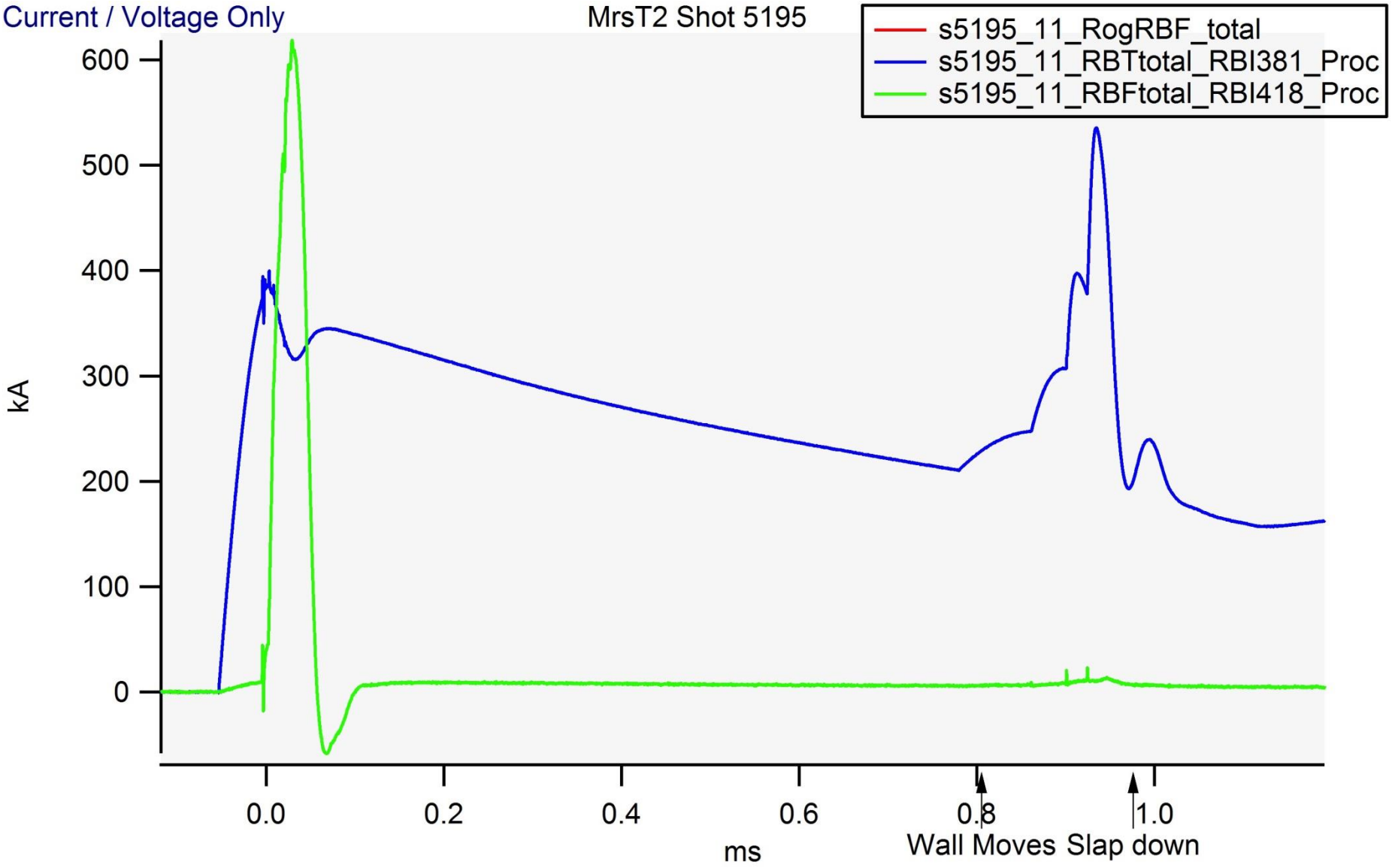
Spherical Shape



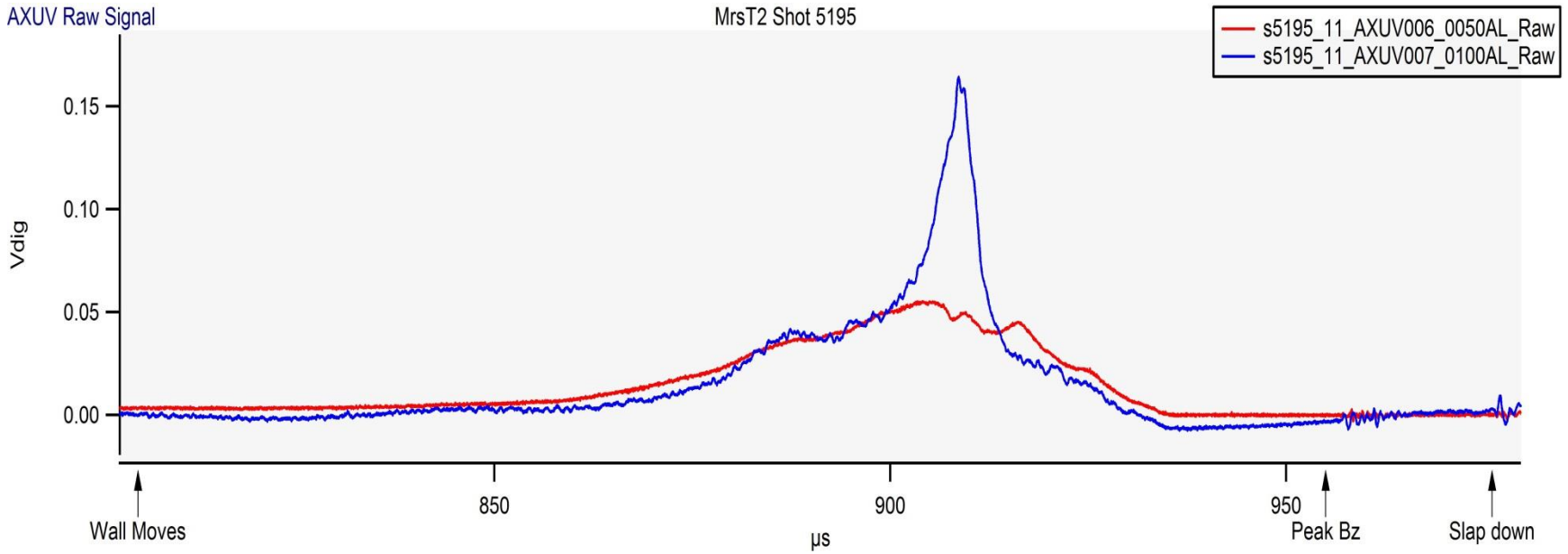
Magnetic Field During Compression

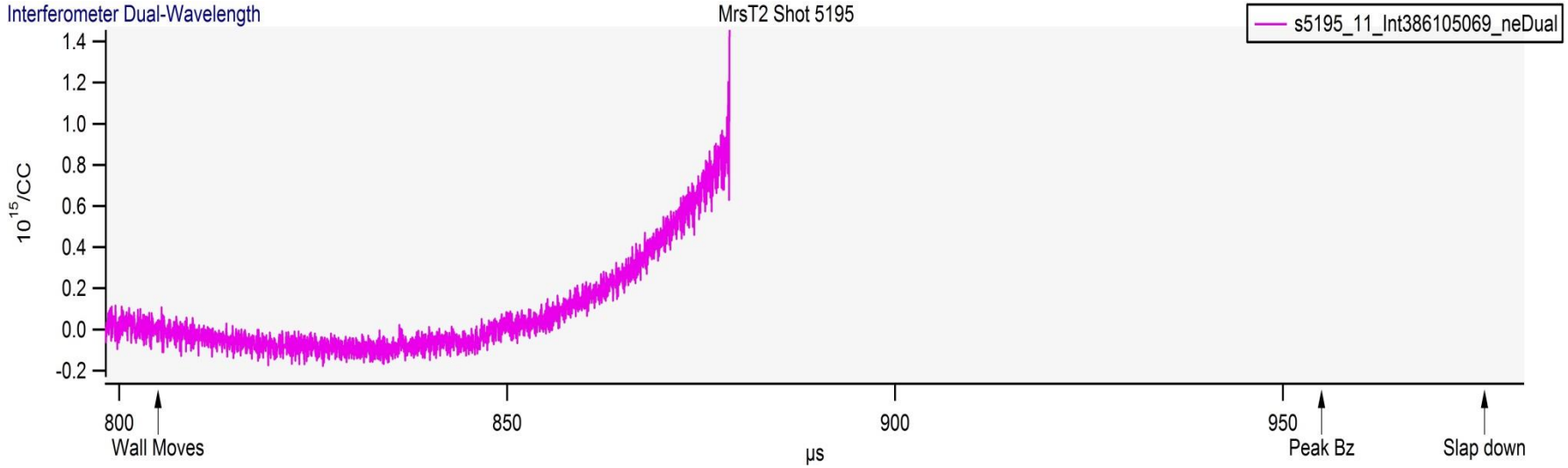


Shaft Current And Formation Current



X-Ray and Density





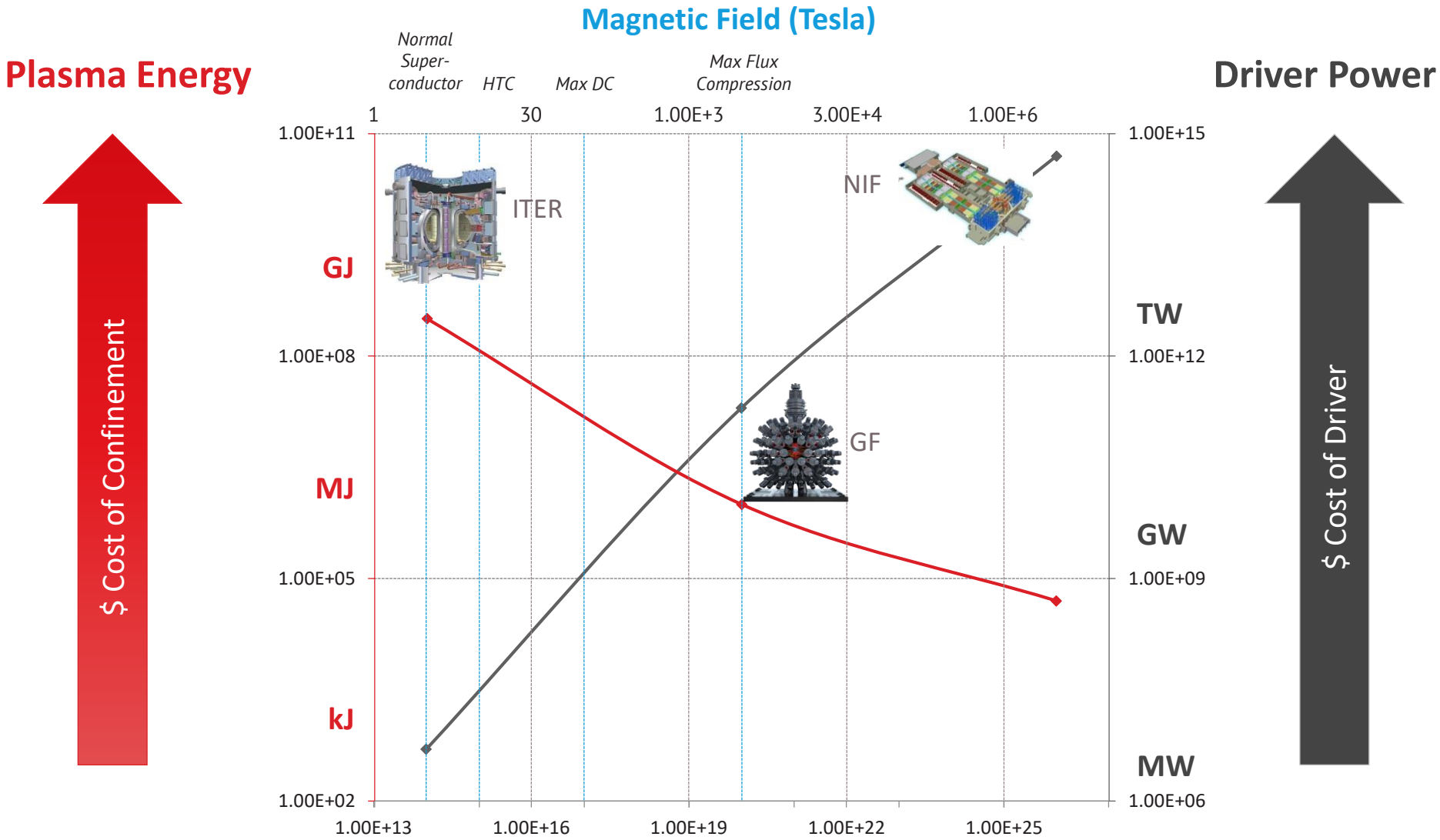
Next Shot

- PCS15 will compress earlier when the plasma is hotter
- Better temperature diagnostic, x-ray, ion Doppler, neutrons
- Unfortunately the current profile is hollow at these earlier time
- Plasma might go unstable

Change to slower liner, less peak energy density

- Peter Turchi and others convinced us that we can't exceed 100T at peak compression due to wall vaporization
- Start with larger flux conserver radius (20 cm to1.5 m), lower density (1e17 cm^{-3} to 3e14 cm^{-3}), hotter (100 eV to 400 eV) plasma
- Slower compression time (100 ms to 4 ms) less compression ratio (10 to 7:1)
- Rotation stabilization of RT instability (1000 rpm)
- Lower peak field (700 T to 100 T) and density (1e20 cm^{-3} to 1e17 cm^{-3})
- Much more LINUS like

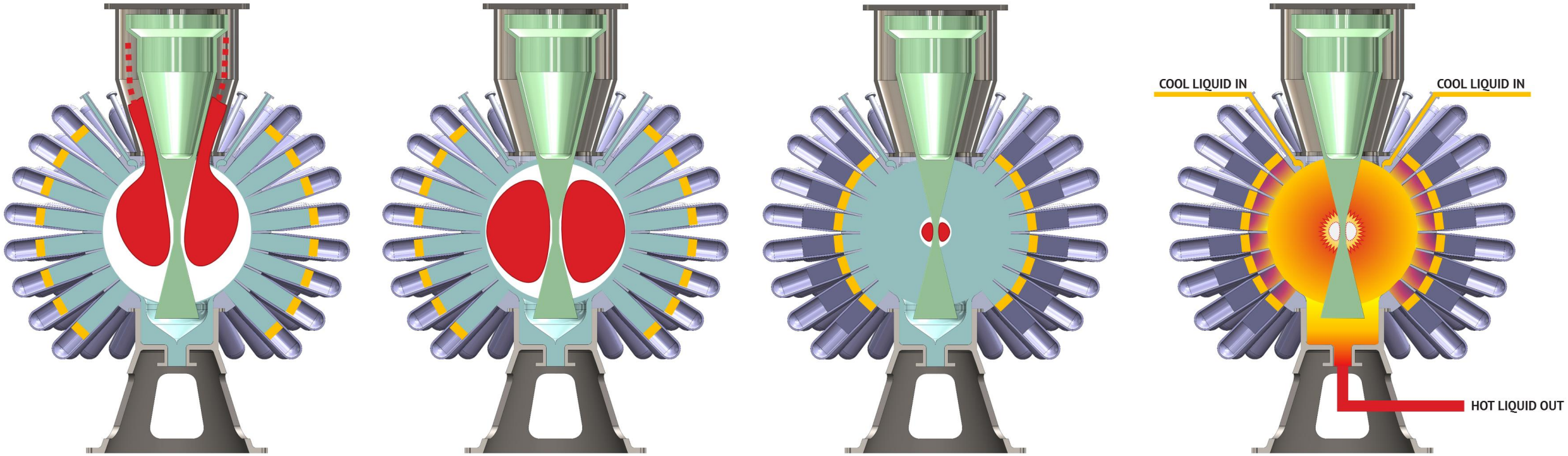
Fusion Technology Comparison



Initial plasma spherical tokamak

- We achieved much better confinement with spherical tokamak
- Lack of toroidal field in edge of spheromak produce stochastic field in the edge, fast electrons escape, poor confinement
- Did not try FRC but I suspect the lack of toroidal there to also cause poor confinement
- Better bet to compress the pretty well known spherical tokamak
- Need central shaft, engineering pain but easier than confinement pain
- To compress spheromak or FRC need faster compression because of poor confinement

General Fusion's Solution



1. Inject Plasma Fuel

2. Compress Plasma Fuel

3. Extract Energy

Next Steps

- Designing a ~1.5 m radius liquid lithium plasma formation and compression machine
- ~1MA of plasma current spherical tokamak starting plasma (MAST/NSTX class)
- Sub-breakeven but high performance (10 keV at 7e16 cm^{-3})
- 3-5 years project

QUESTIONS?

generalfusion

Twitter
@generalfusion

Instagram
@generalfusion

LinkedIn
general-fusion