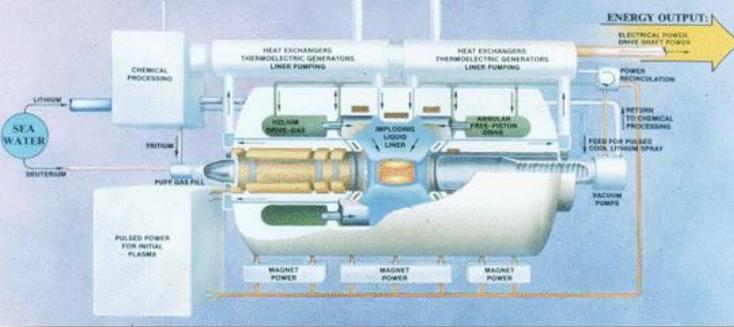


General Fusion

LINUS Concept (1976)



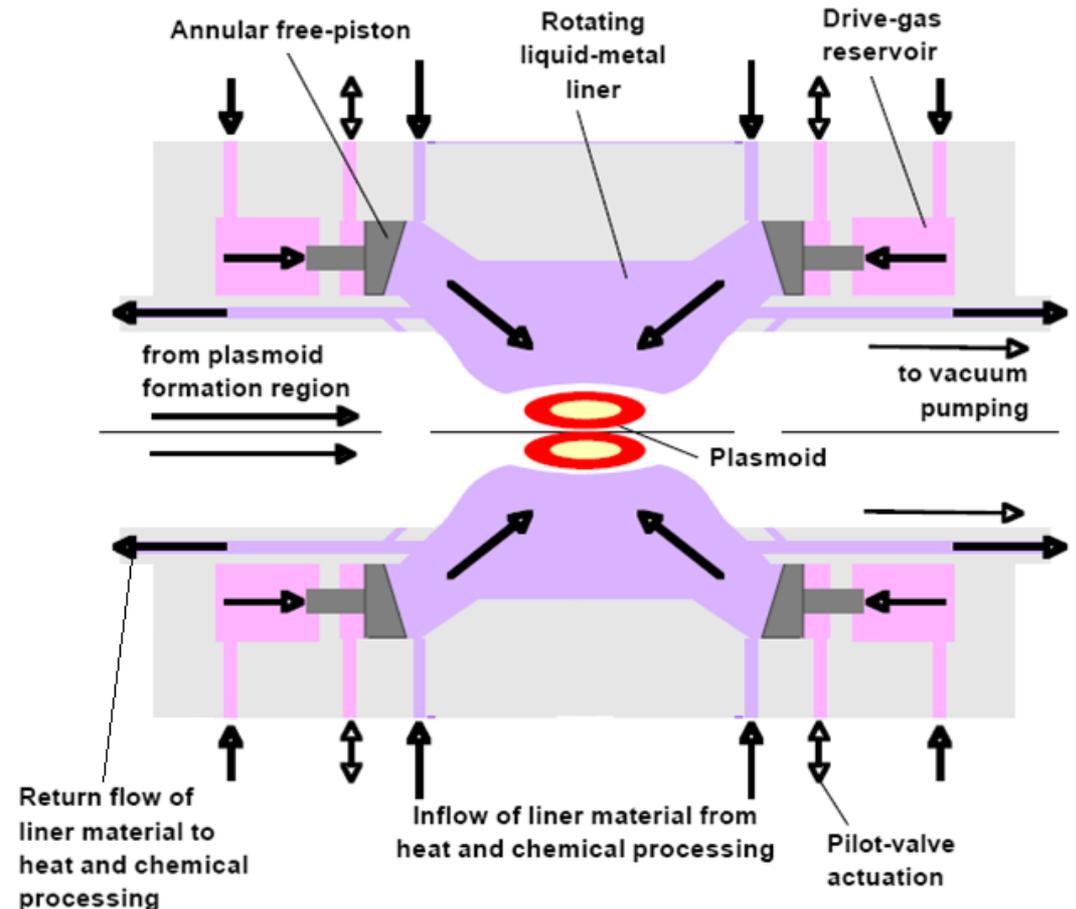
The MTF “Solution”

Recognized as:

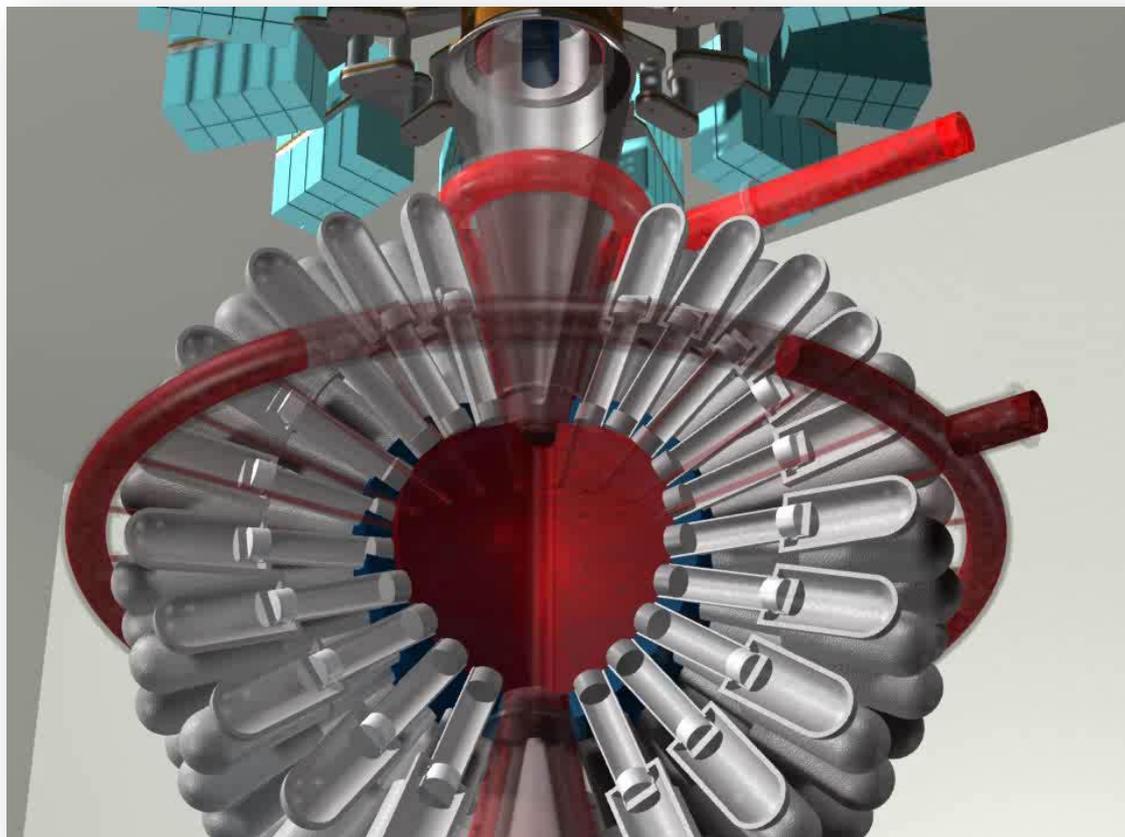
- Low cost
- Practical

Fixed:

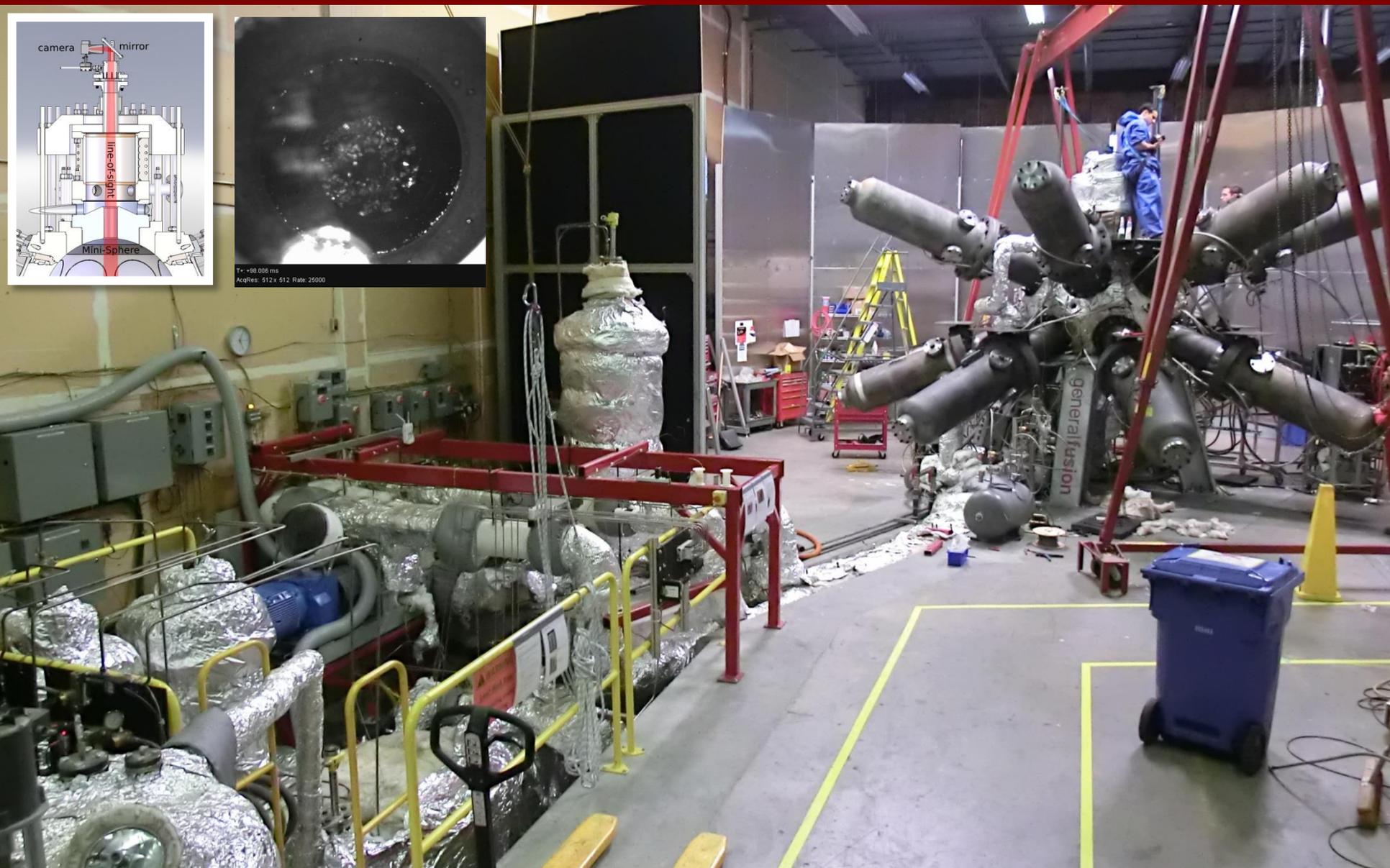
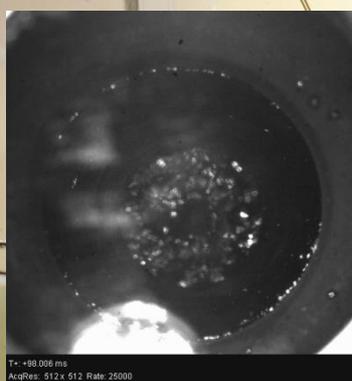
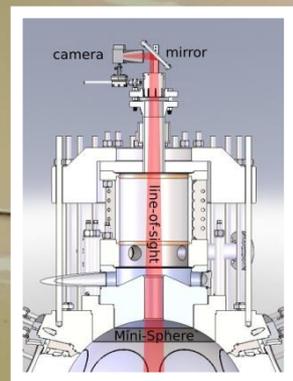
- First wall problem
- Stand off problem
- Cost/shot problem
- Fuel rebreeding



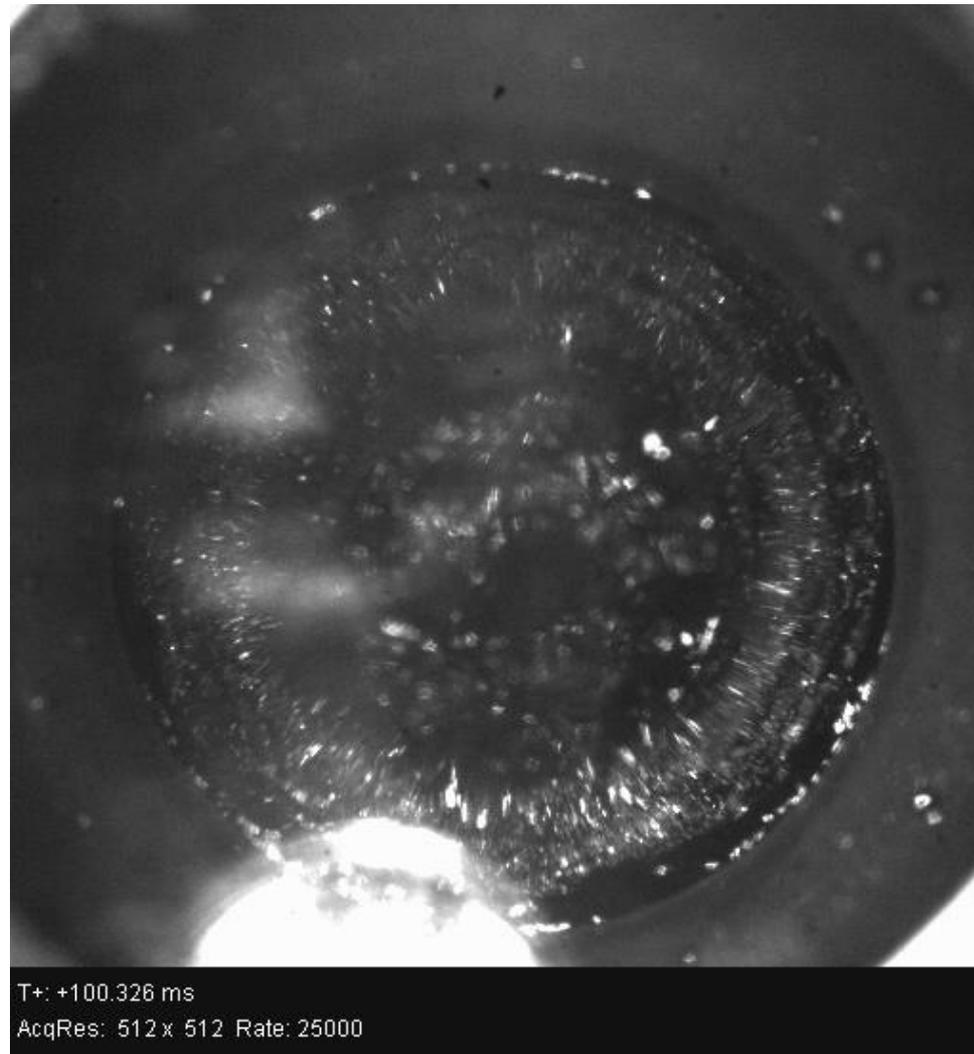
General Fusion's Acoustically Driven MTF



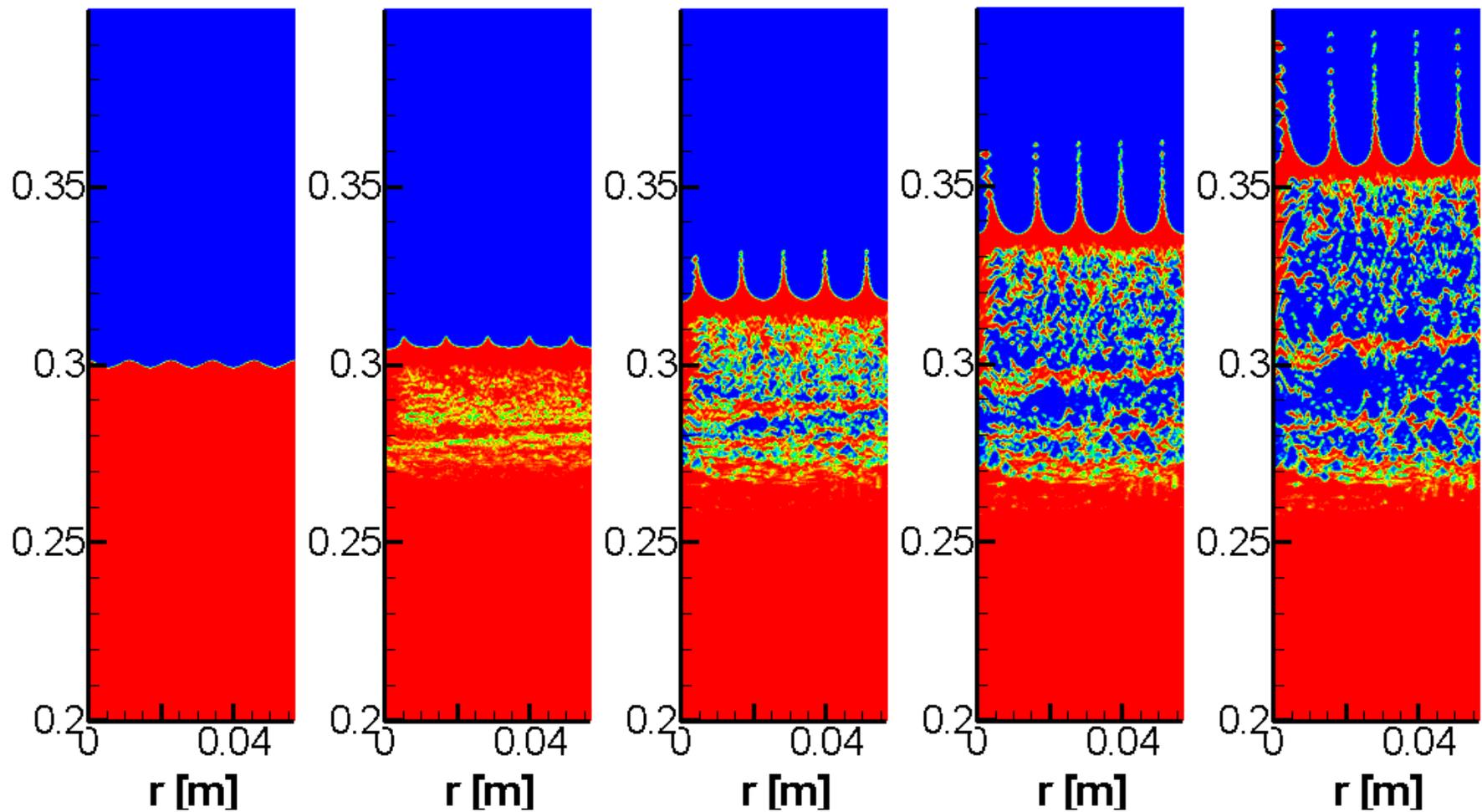
Mini-sphere – 14 full scale pistons, liquid metal vortex



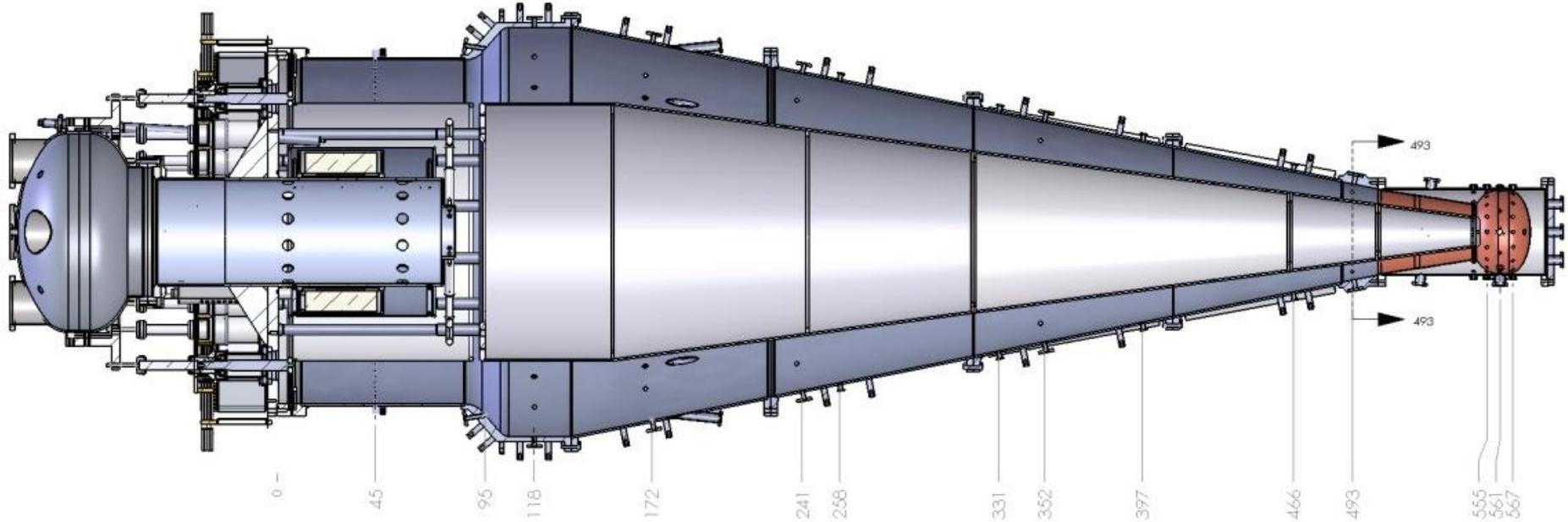
Liquid Pb Vortex Collapse



RM Instabilities and Simulation



Plasma Injector Design



Power Supply

- 2.4 MJ pulse power supply (22 kV formation, 44 kV acceleration)
- programmable pulse shaping control
- 1 MW DC stuffing flux power supply

Diagnostics

- Thomson scattering
- 5 interferometer chords
- >12 Rogowski coils
- >50 B-dot probes with in-situ integration
- high resolution time resolved spectroscopy
- 1 million frame/second video camera
- X-ray photo diodes
- triple Langmuir probe

**Largest Plasma Injectors
ever built**

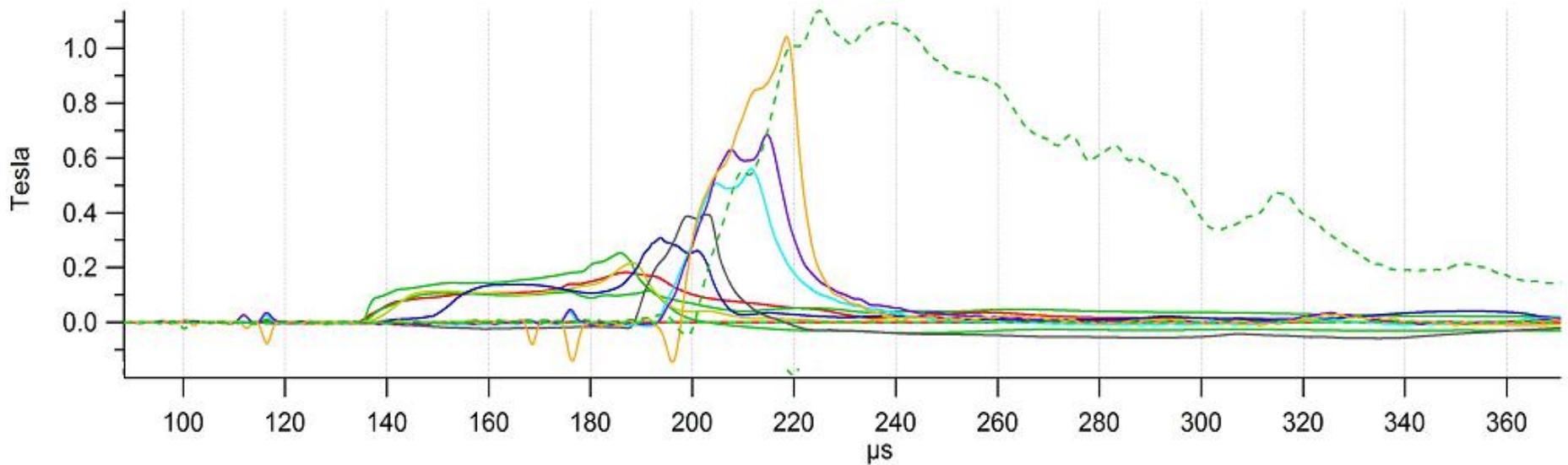
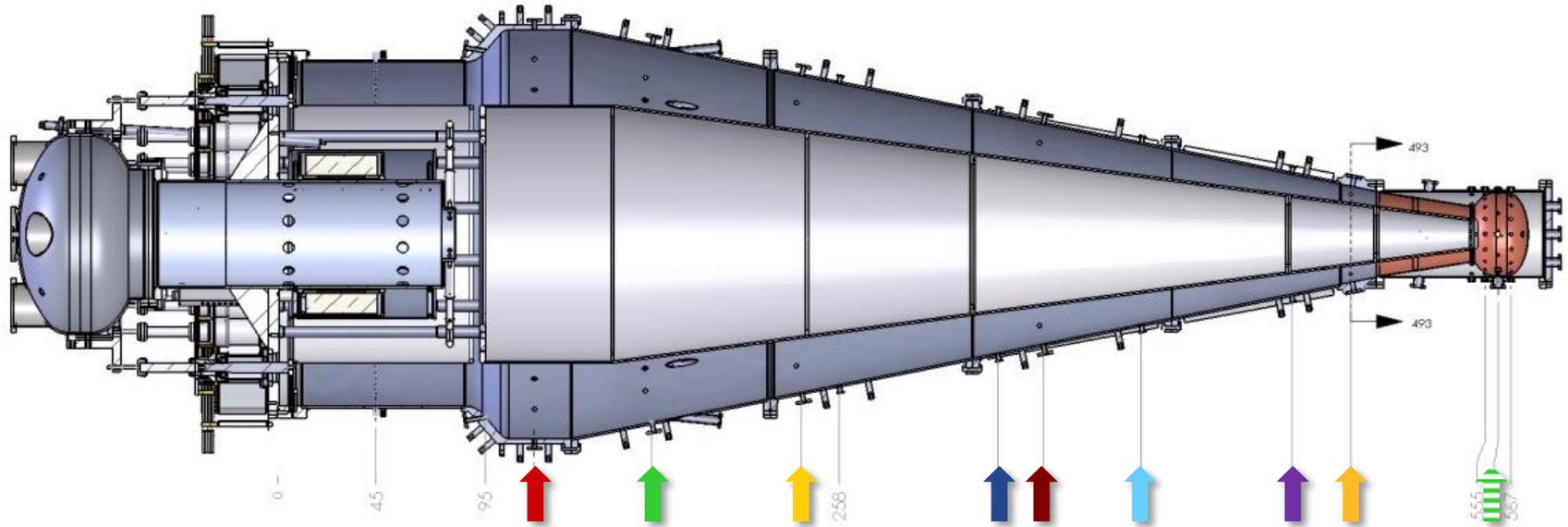
**Record spheromak
plasma energy (~100 kJ)**

**Plasma temperatures over
200 eV (>2.3M °C)**

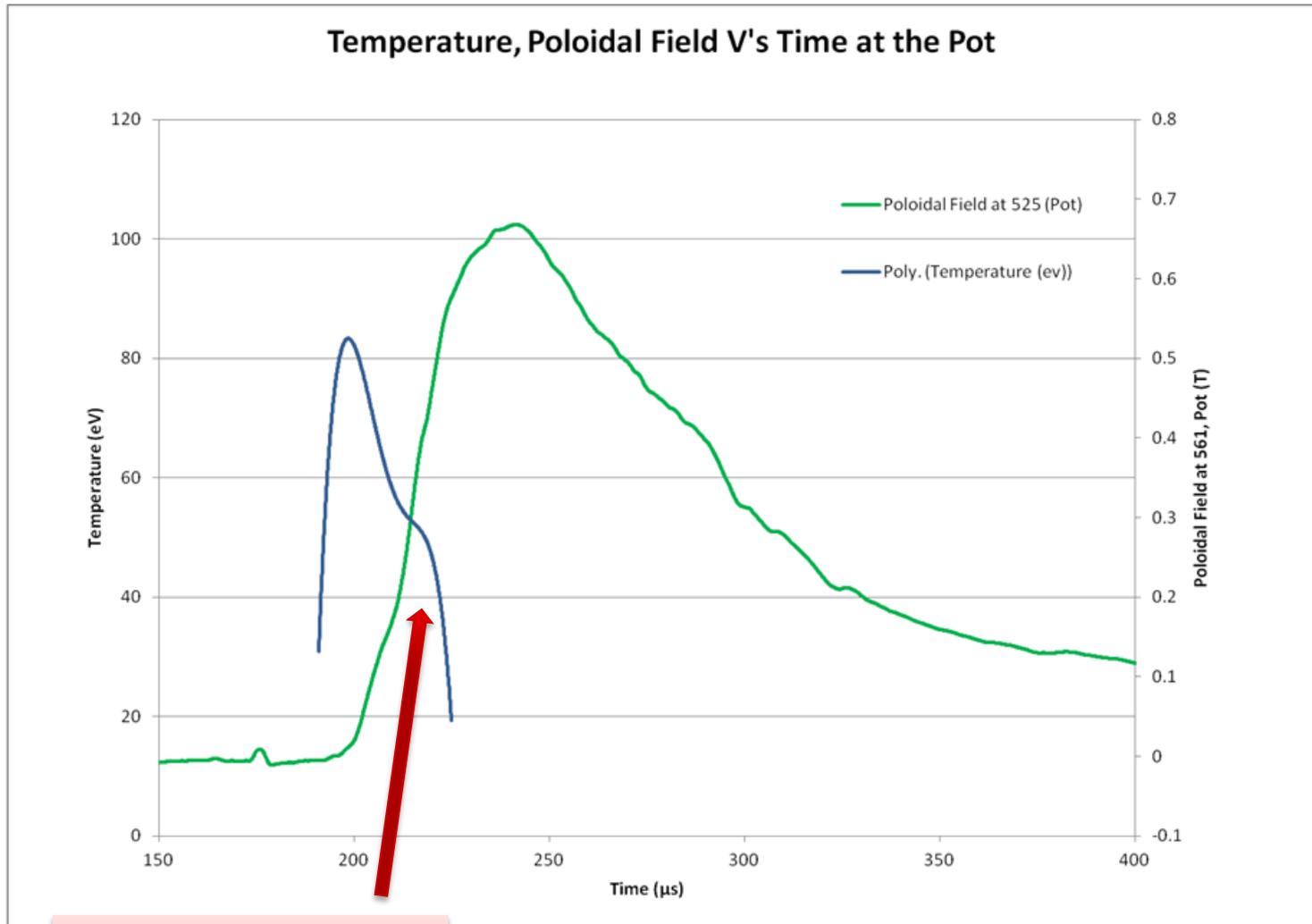
Density of 10^{16} cm^{-3}



Plasma Acceleration

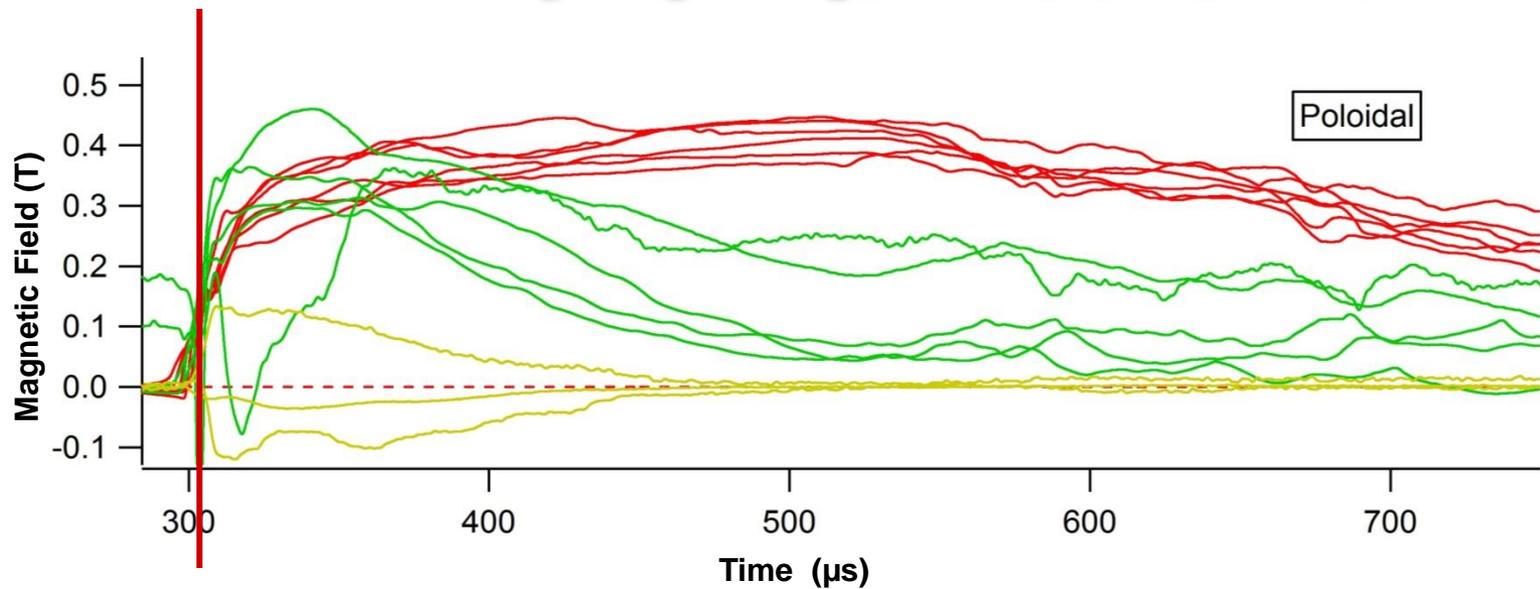
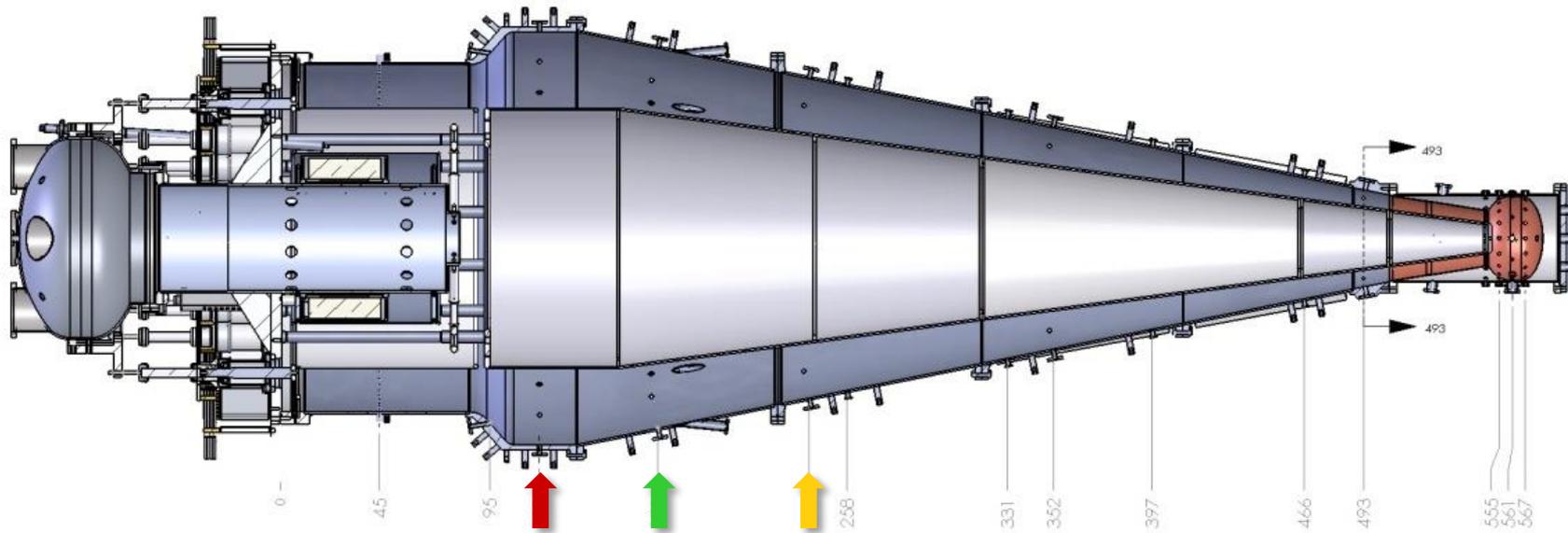


Compressible Plasma Challenge



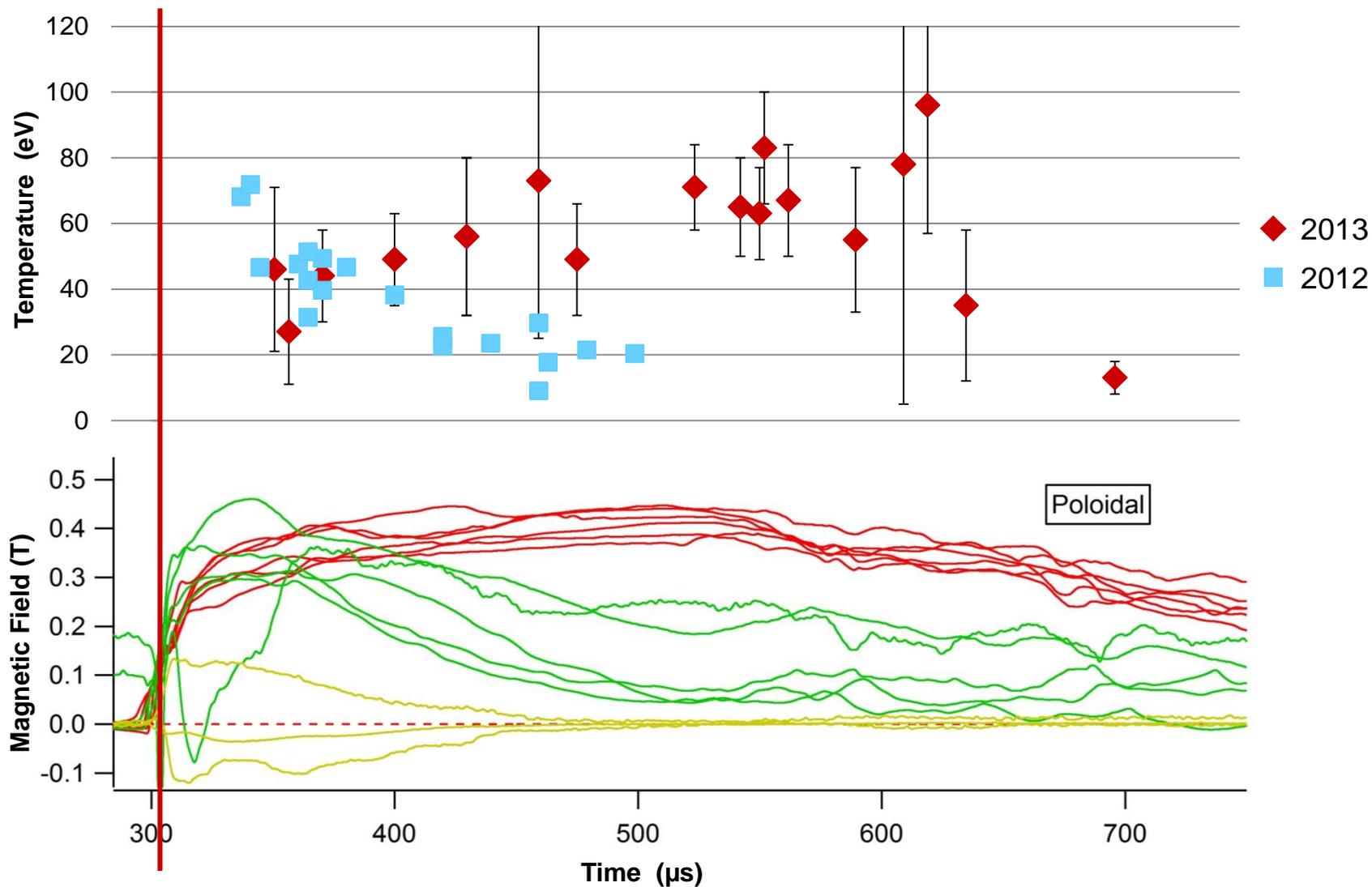
Plasma rapidly cools when entering pot

Plasma Formation



Plasma Formation

Thomson Scattering Temperature vs. Time after Formation



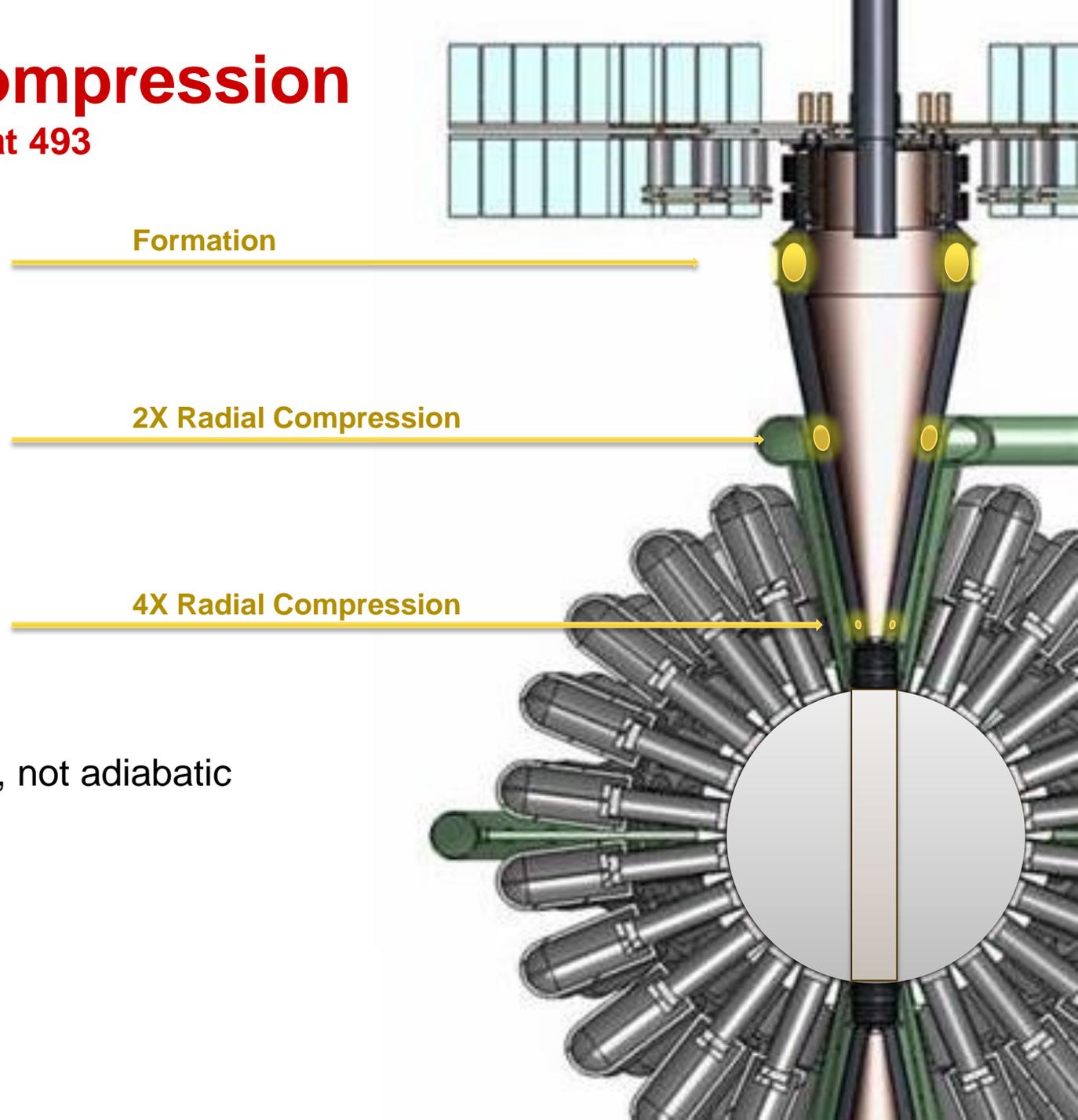
Plasma Compression

Pursuit of 500 eV at 493

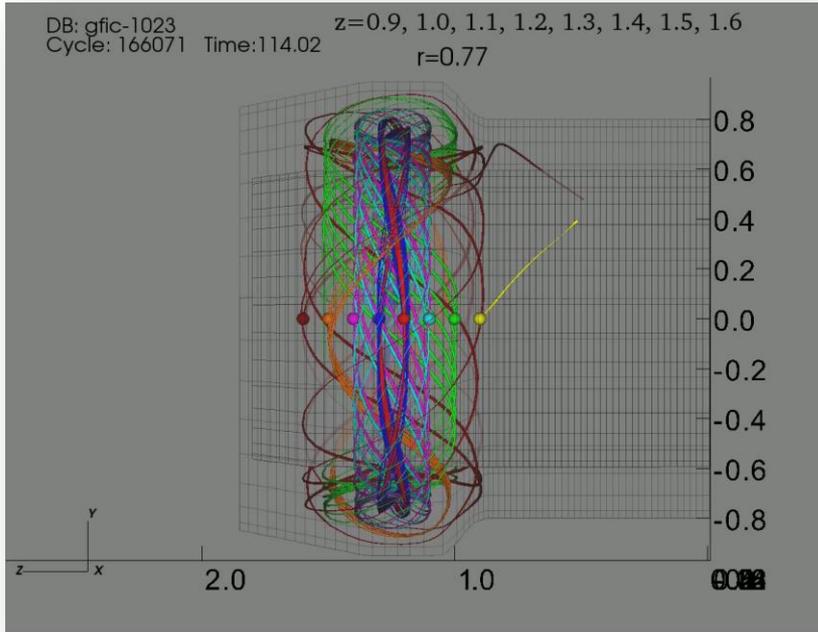
- 10^{14} cm^{-3}
- 40 eV
- 0.2 T

- $8 \times 10^{14} \text{ cm}^{-3}$
- 160 eV
- 0.8 T
- **Adiabatic!**

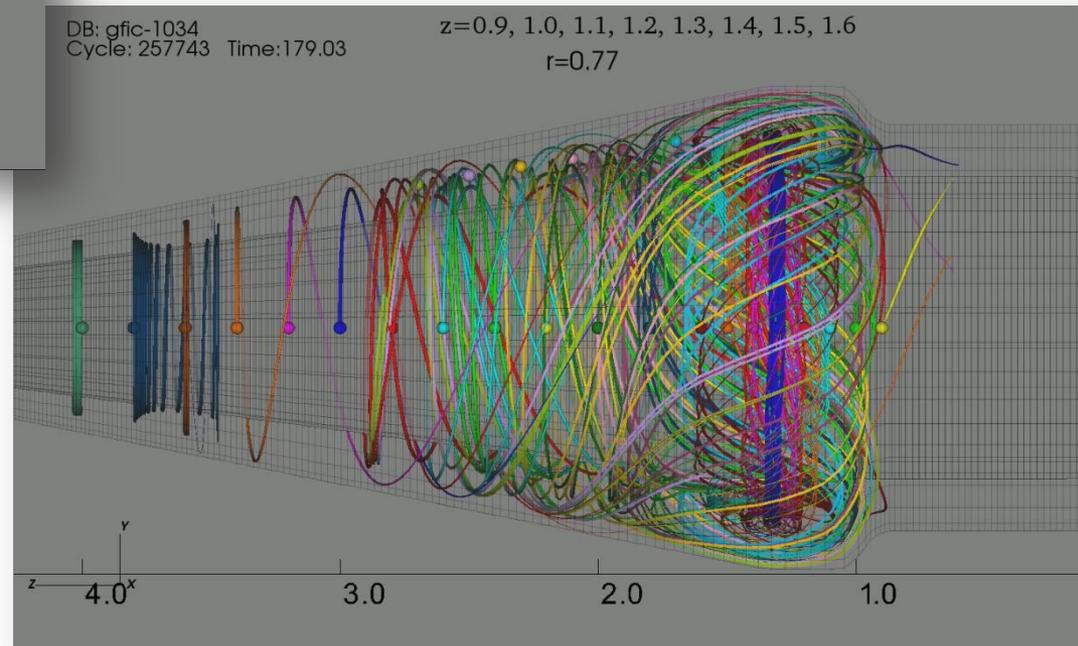
- $6 \times 10^{15} \text{ cm}^{-3}$
- 3.2 T
- 200 eV
- Expect >600 eV, not adiabatic



Plasma Injector: Confinement



Formation



Acceleration

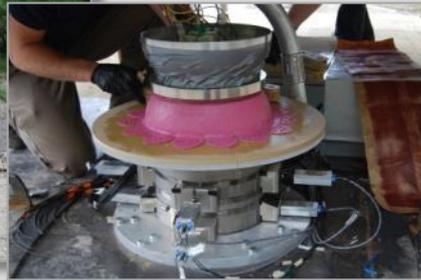
Plasma Compression Experiments

Experiments designed to verify:

- a) Plasma heat loss
- b) Plasma / wall interaction

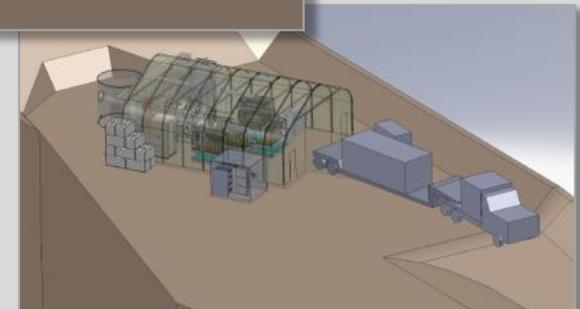
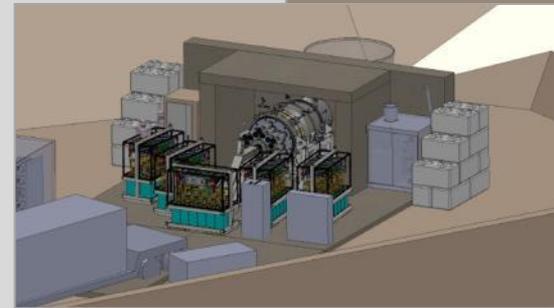
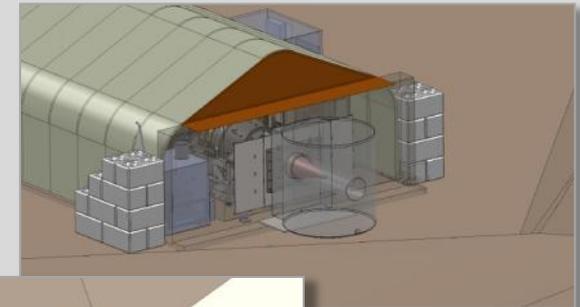
Small Tests

- Achieve 10 keV

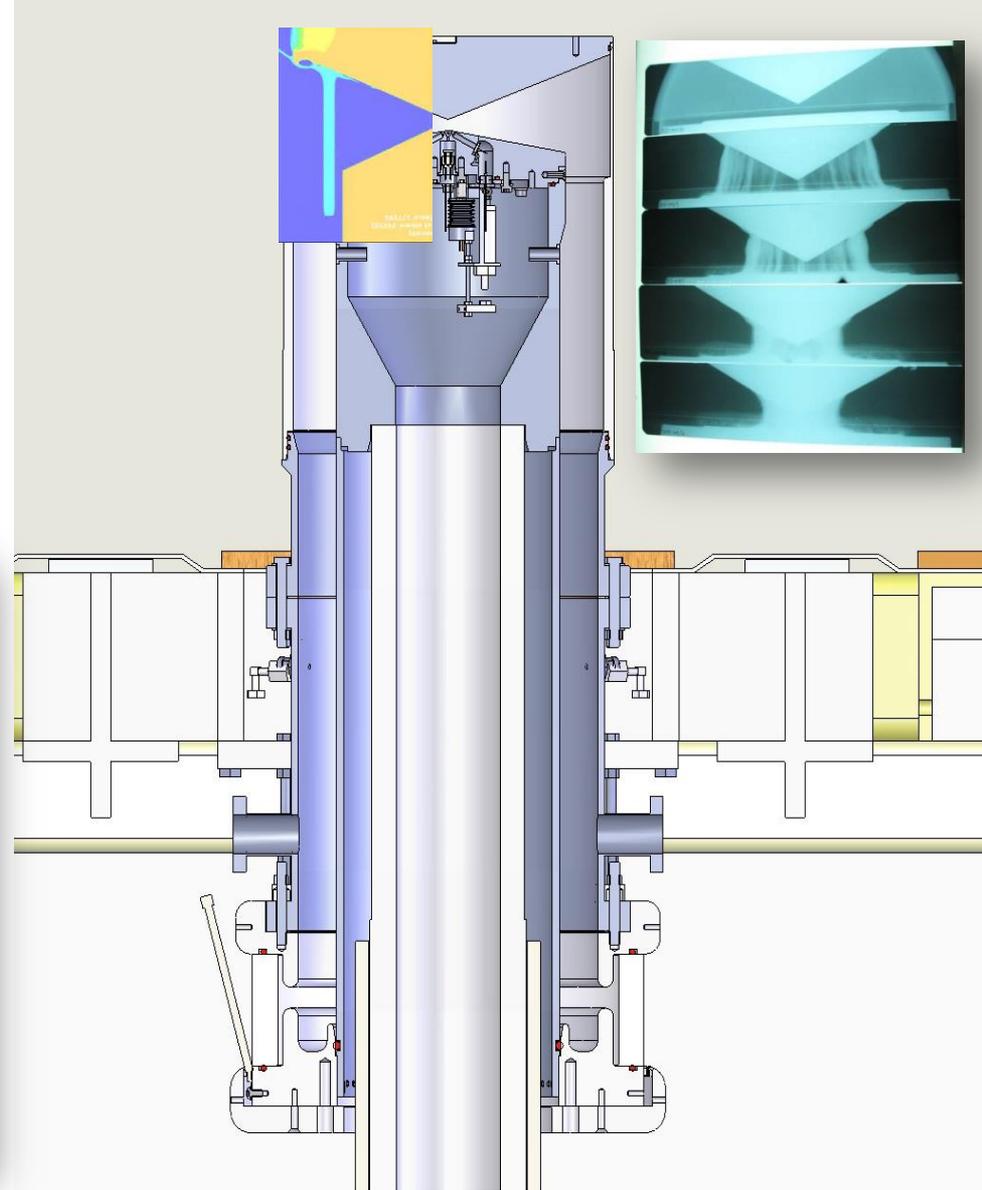
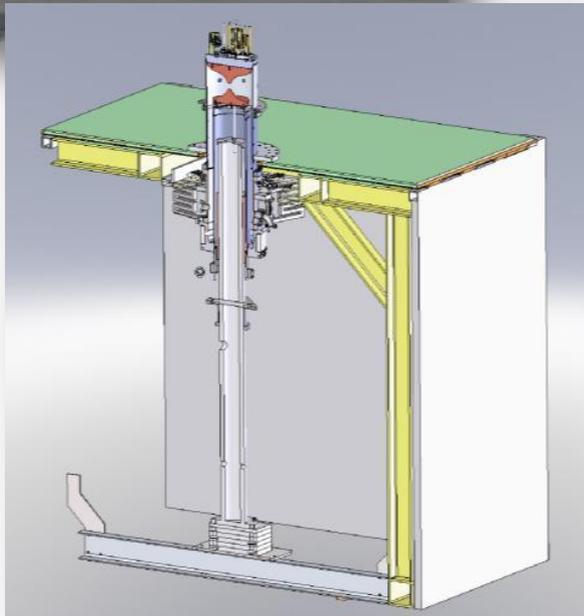


Large Tests

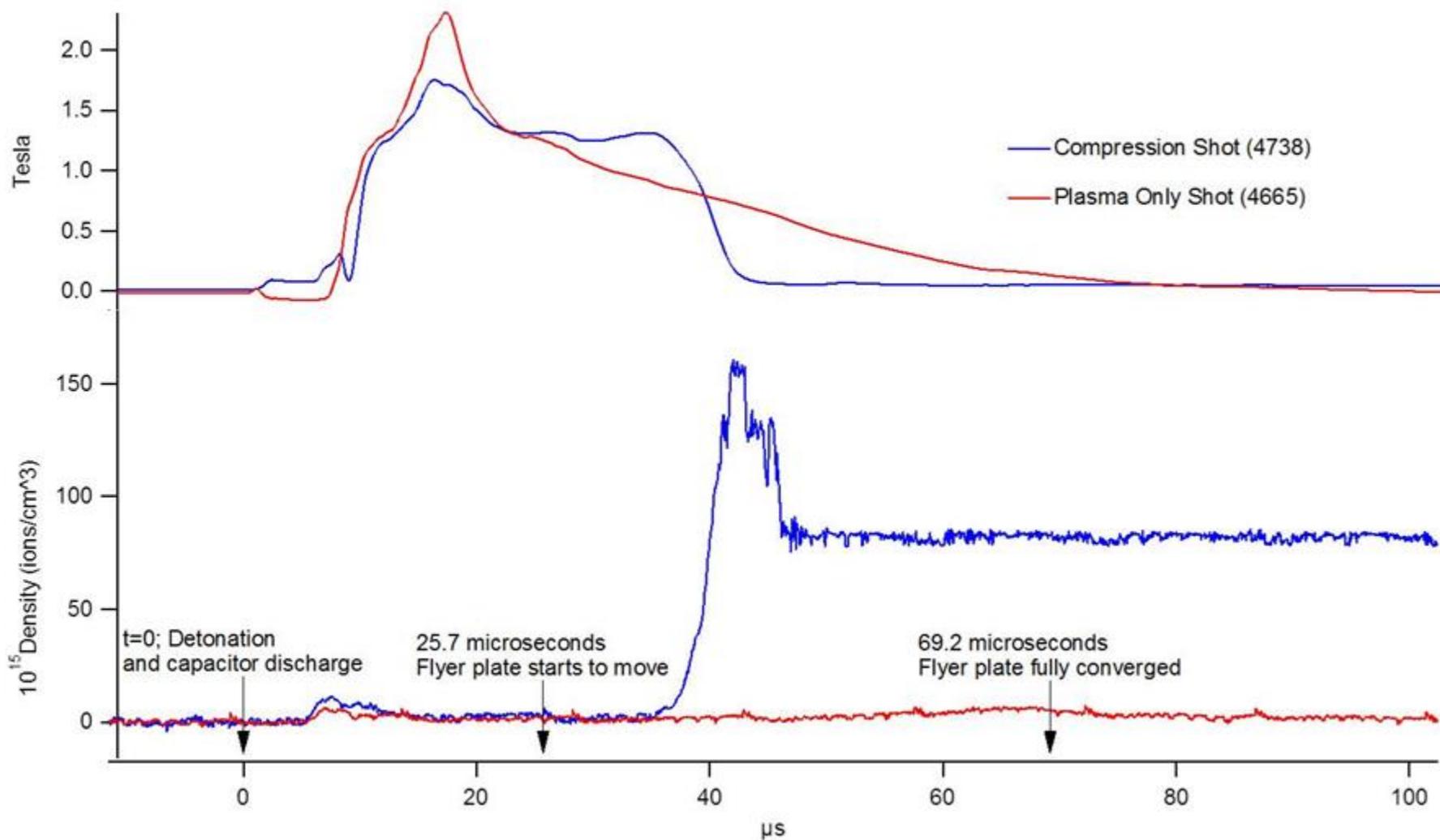
- Achieve 10 keV, 10^{20}cm^{-3} , $10\mu\text{s}$
- ✓ **Equivalent net gain**



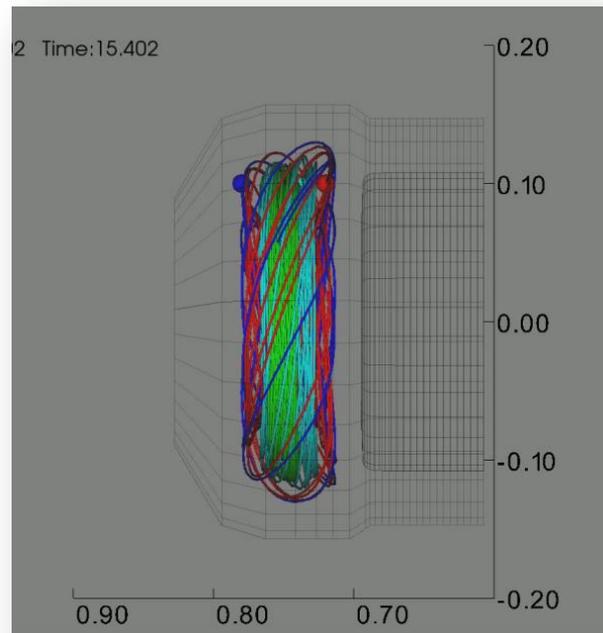
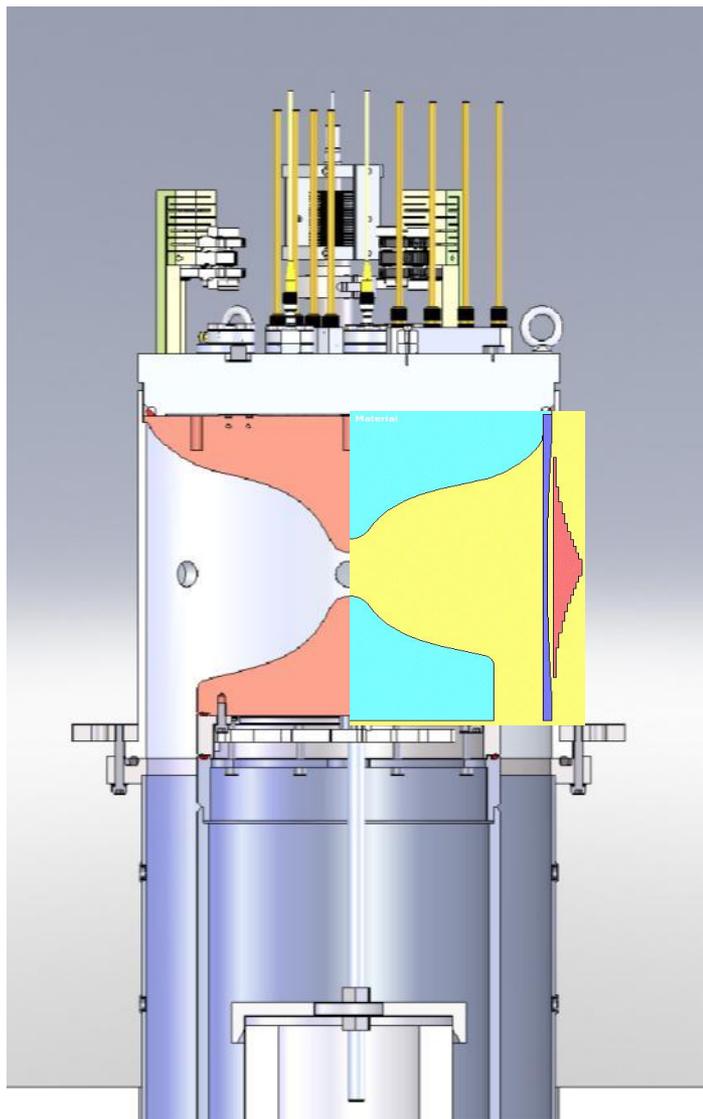
Plasma Compression: Liner Experiments



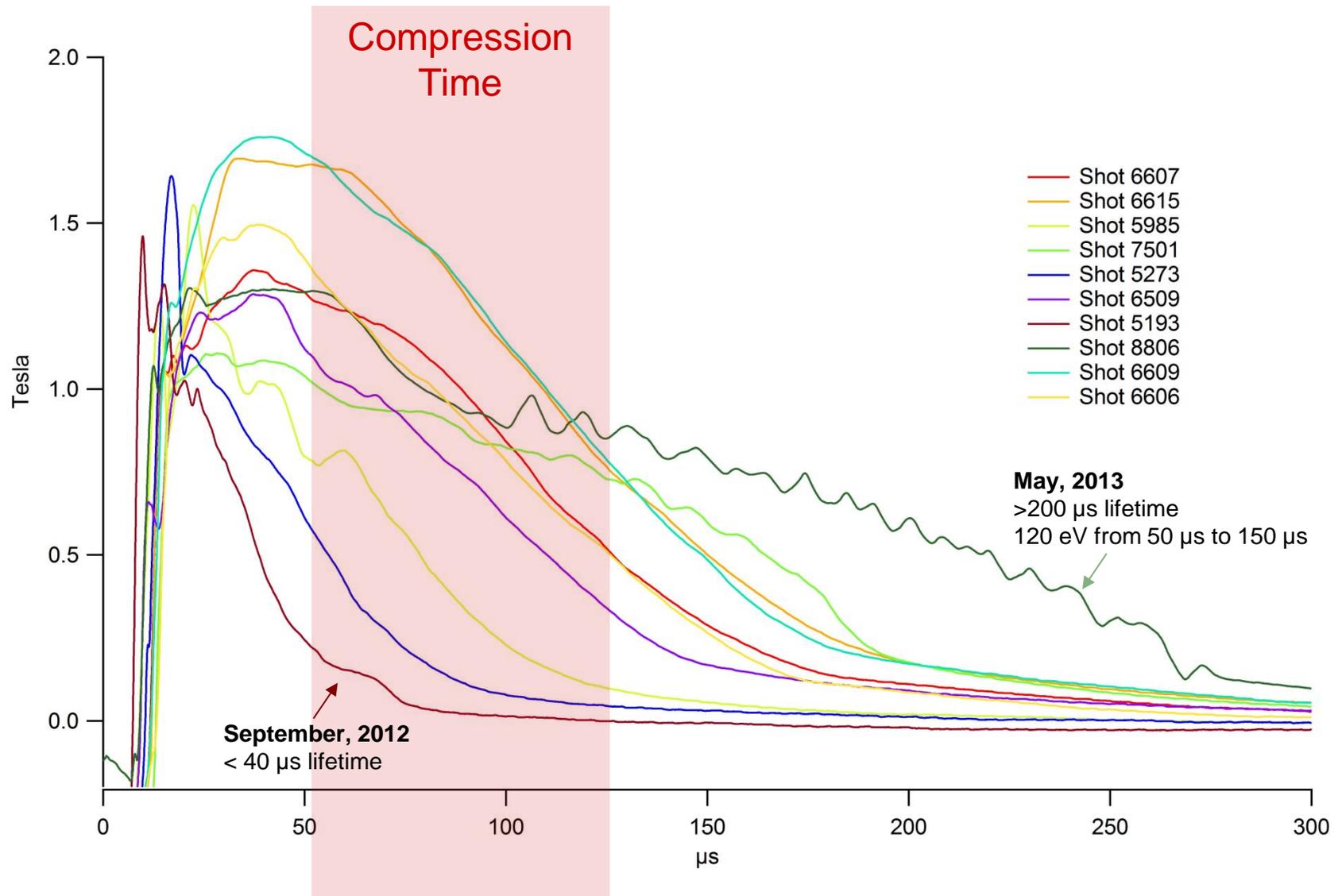
Plasma Compression: First Test May 2012



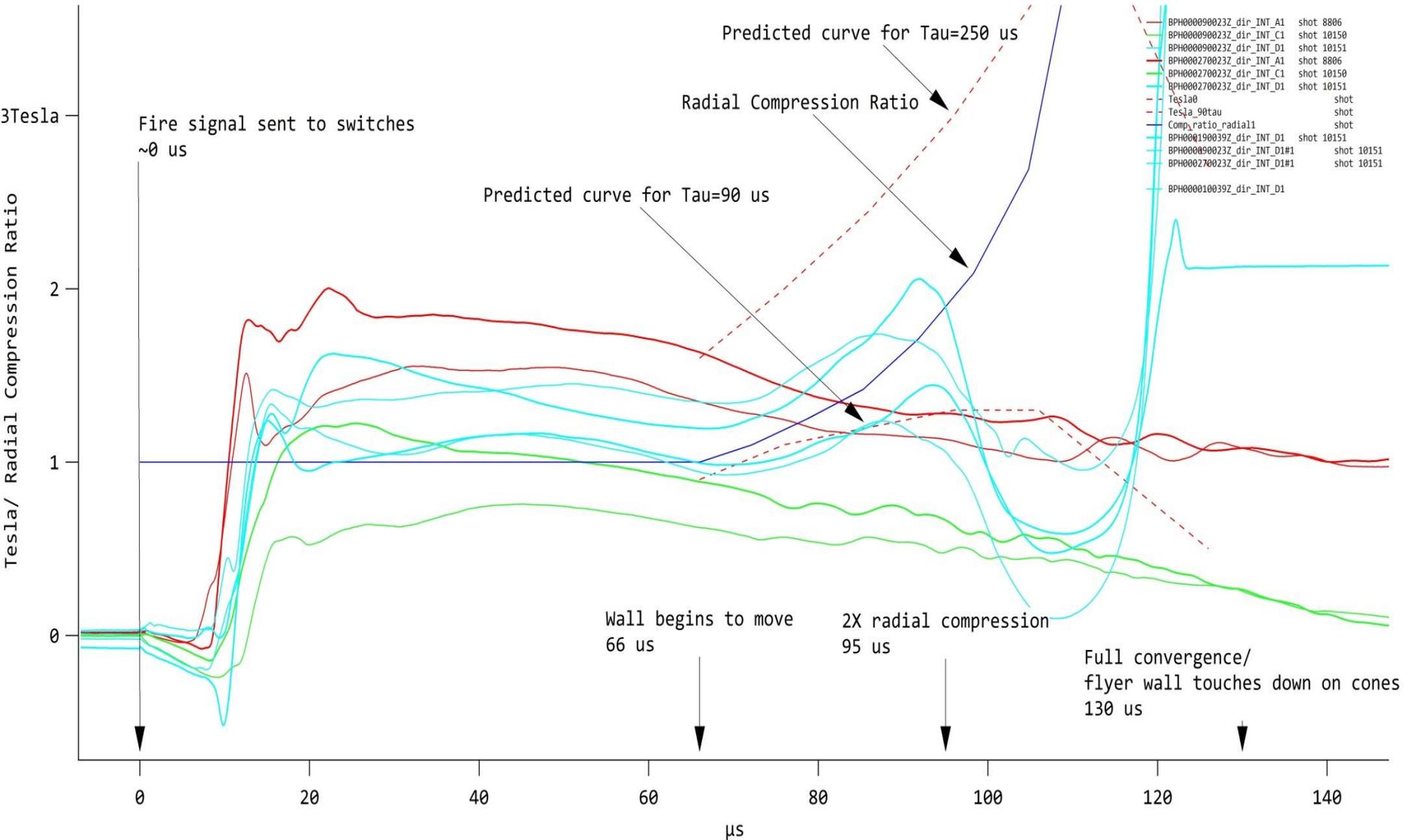
Plasma Compression Configuration Improvement



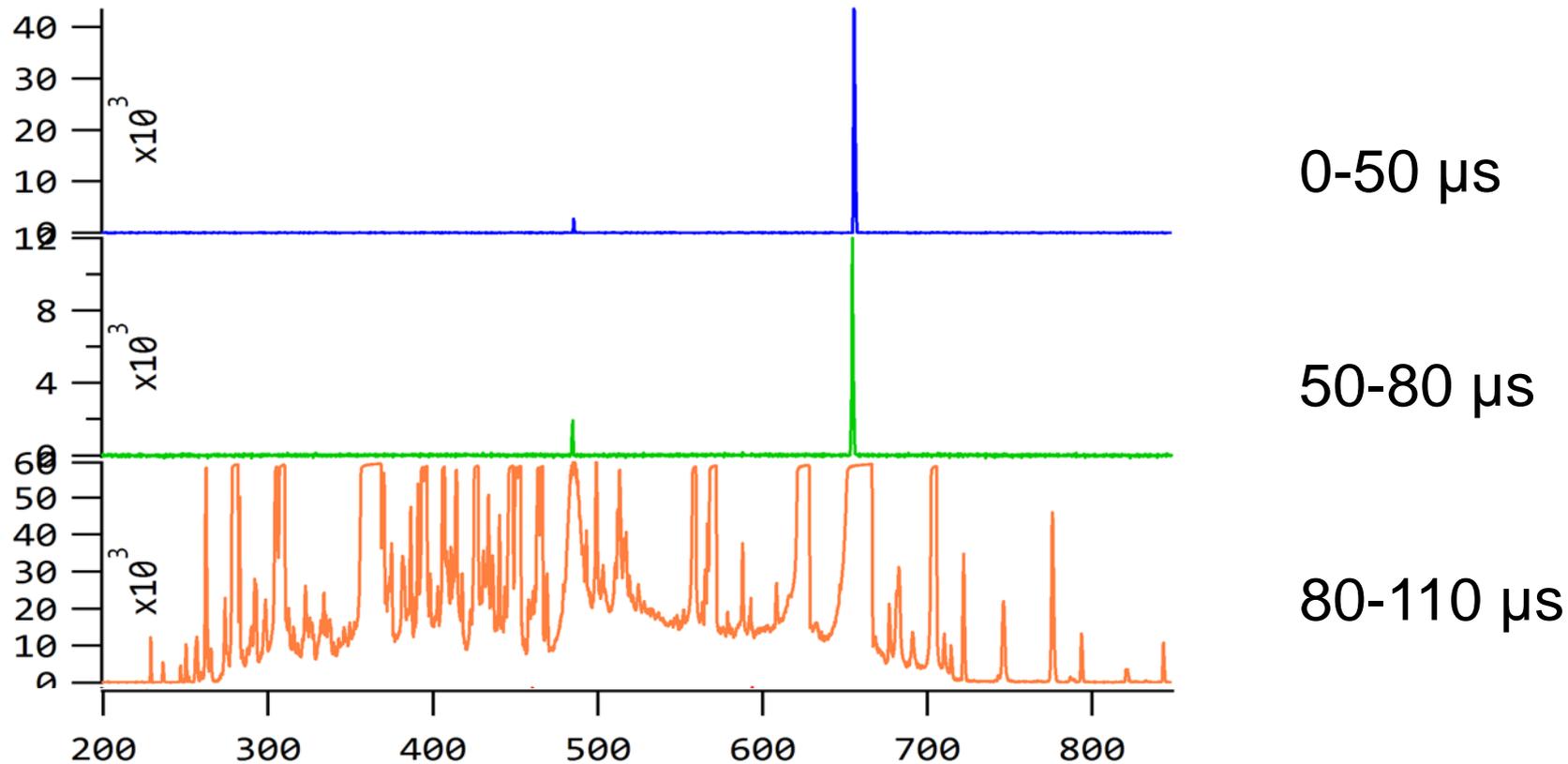
Small Injector Plasma Improvement: May, 2013



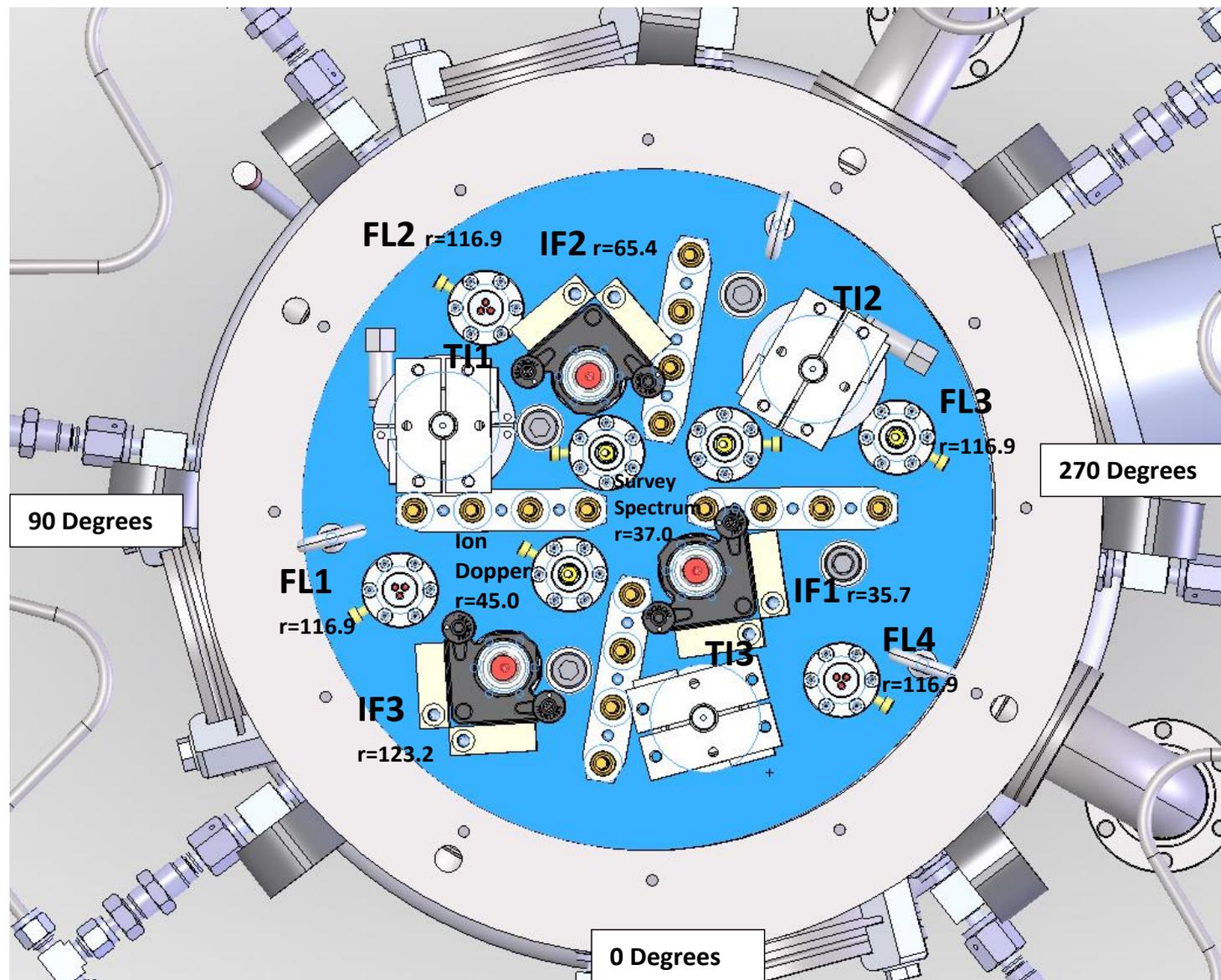
Plasma Compression Test 2: Magnetic Field Data



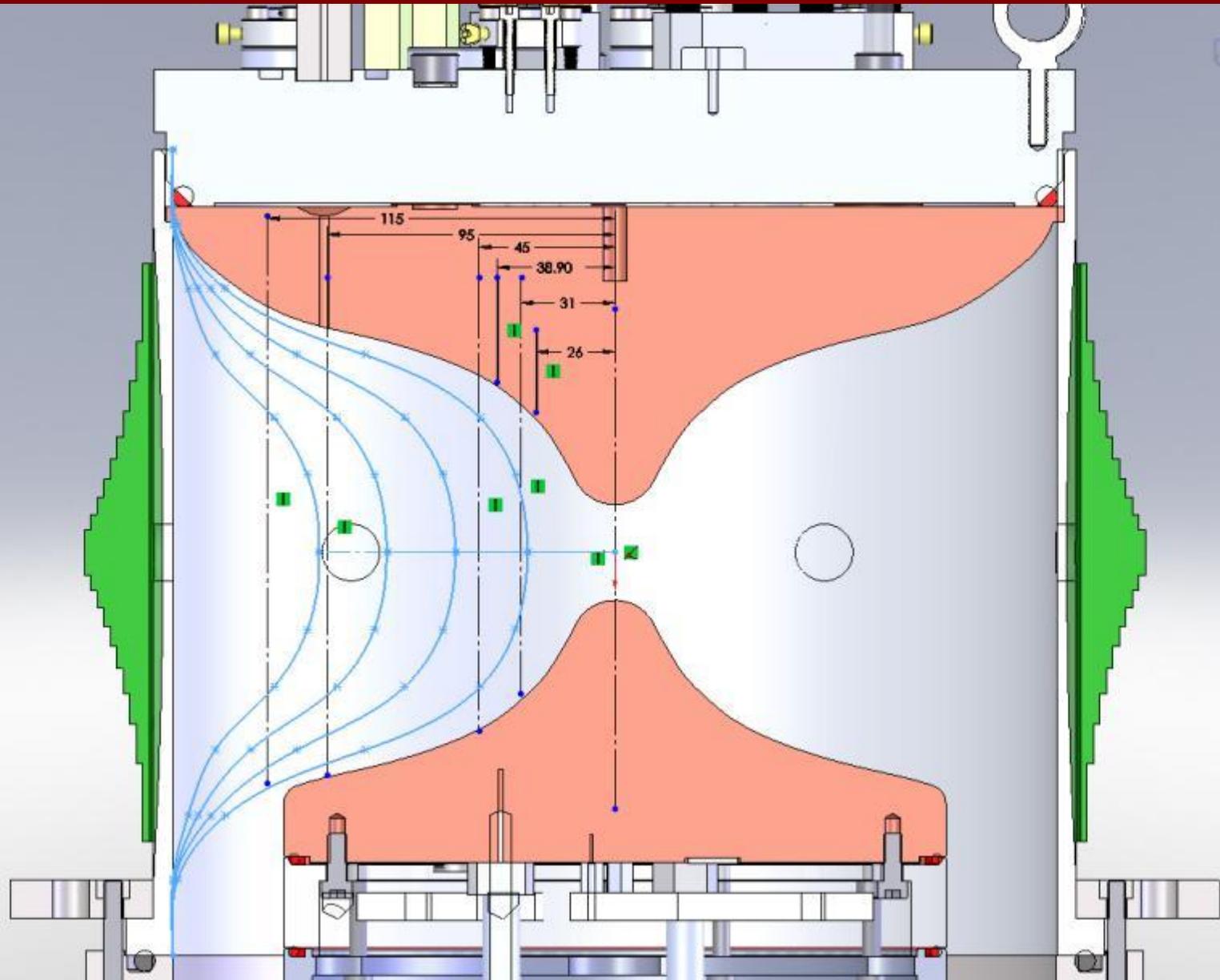
Test 2: Spectra during different time periods



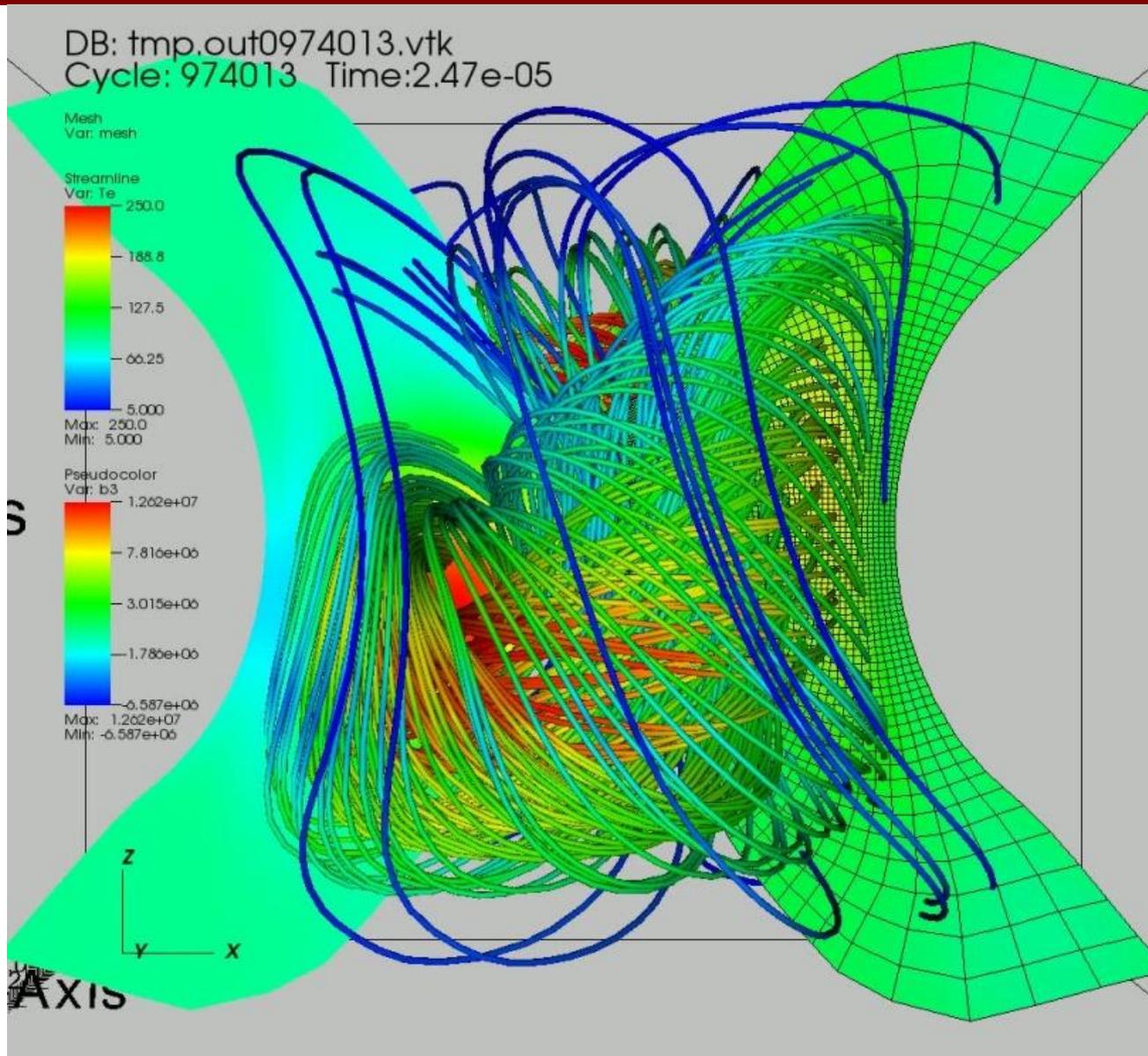
Plasma Compression Diagnostics Layout



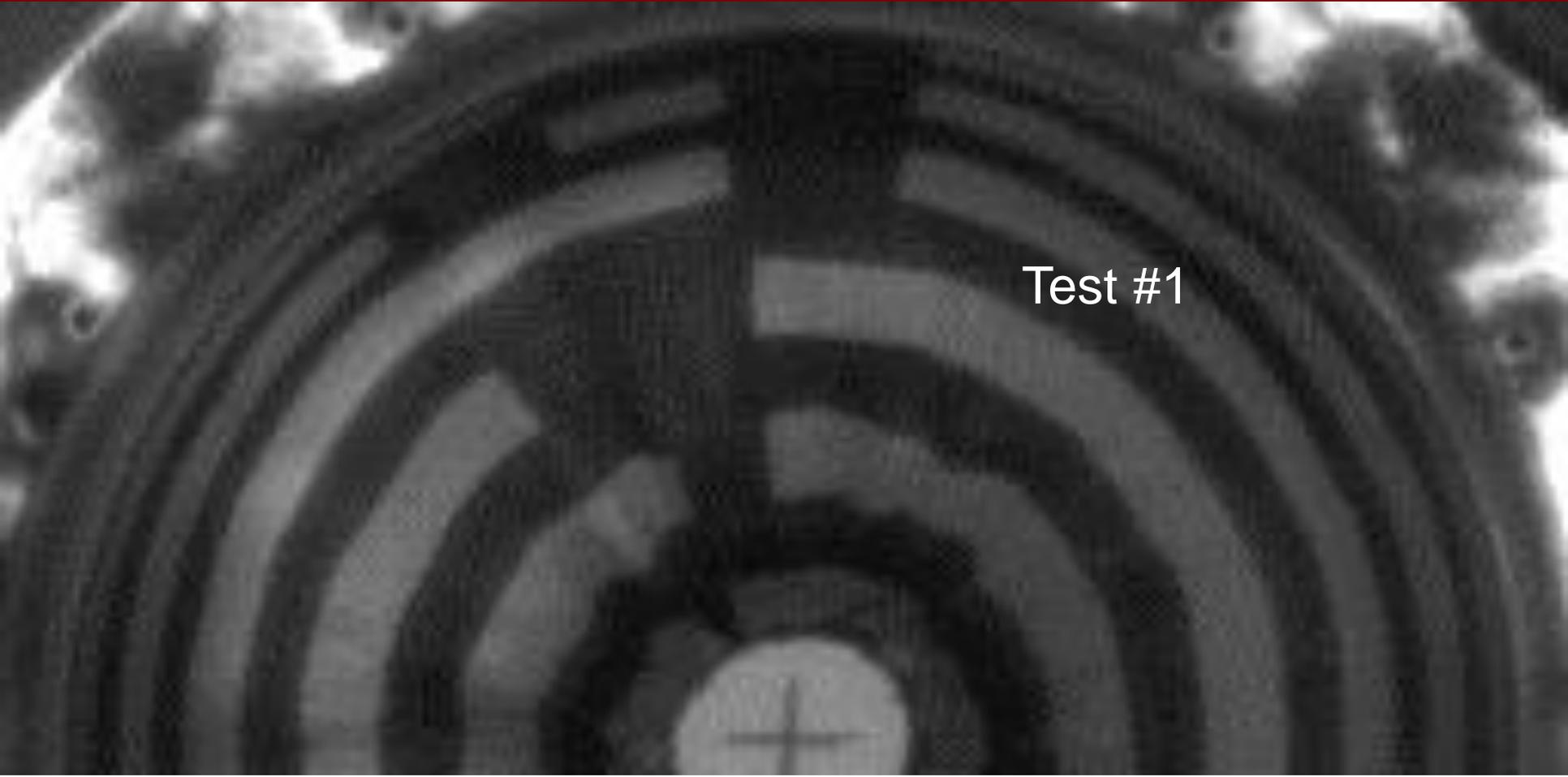
Plasma Compression Cross Section



Cone Configuration - Tilt Unstable



Thicker Walled Compression Chamber

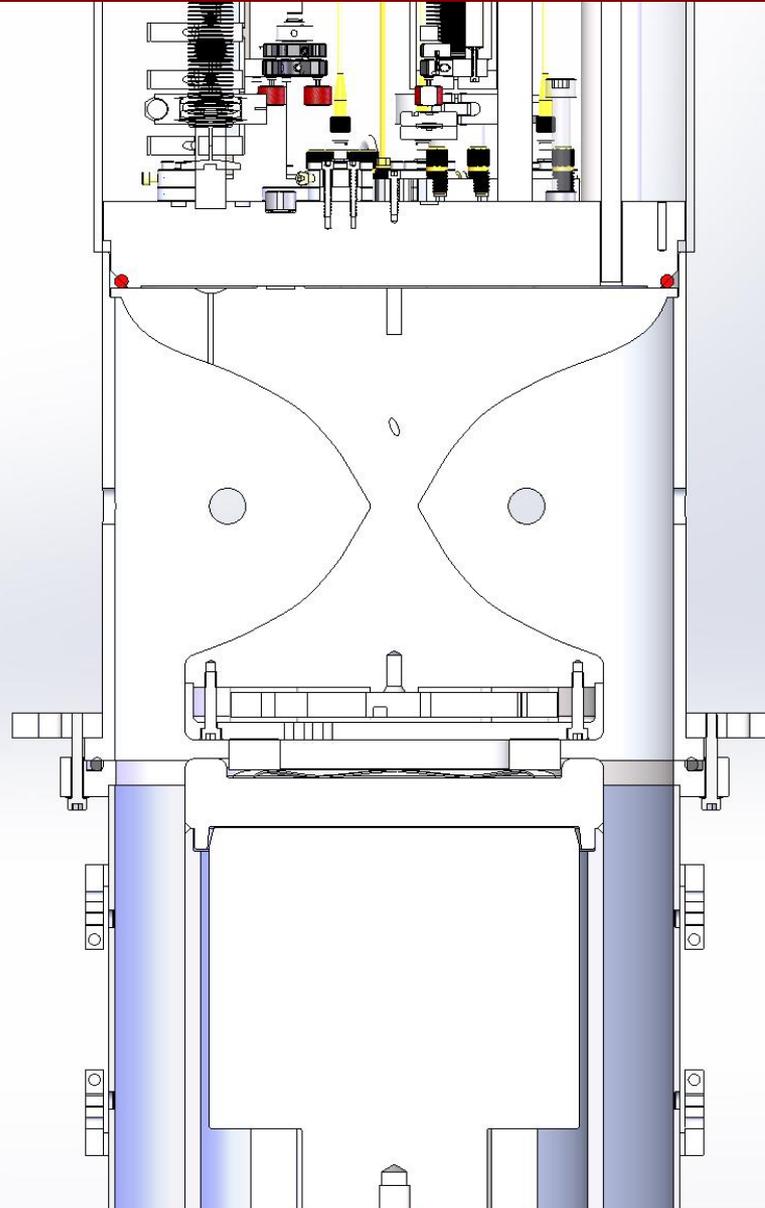


Test #1

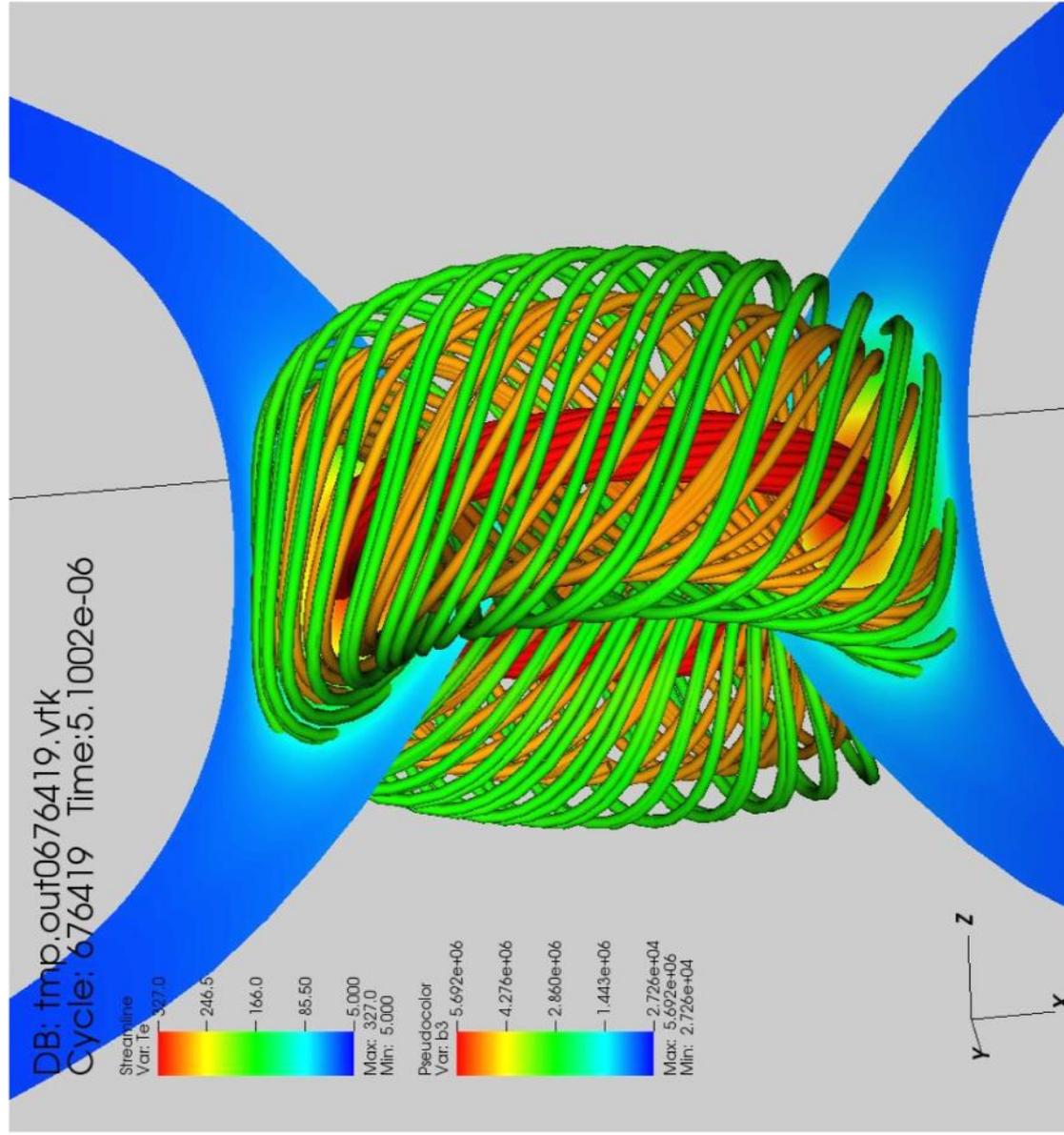


Test #2
>13:1

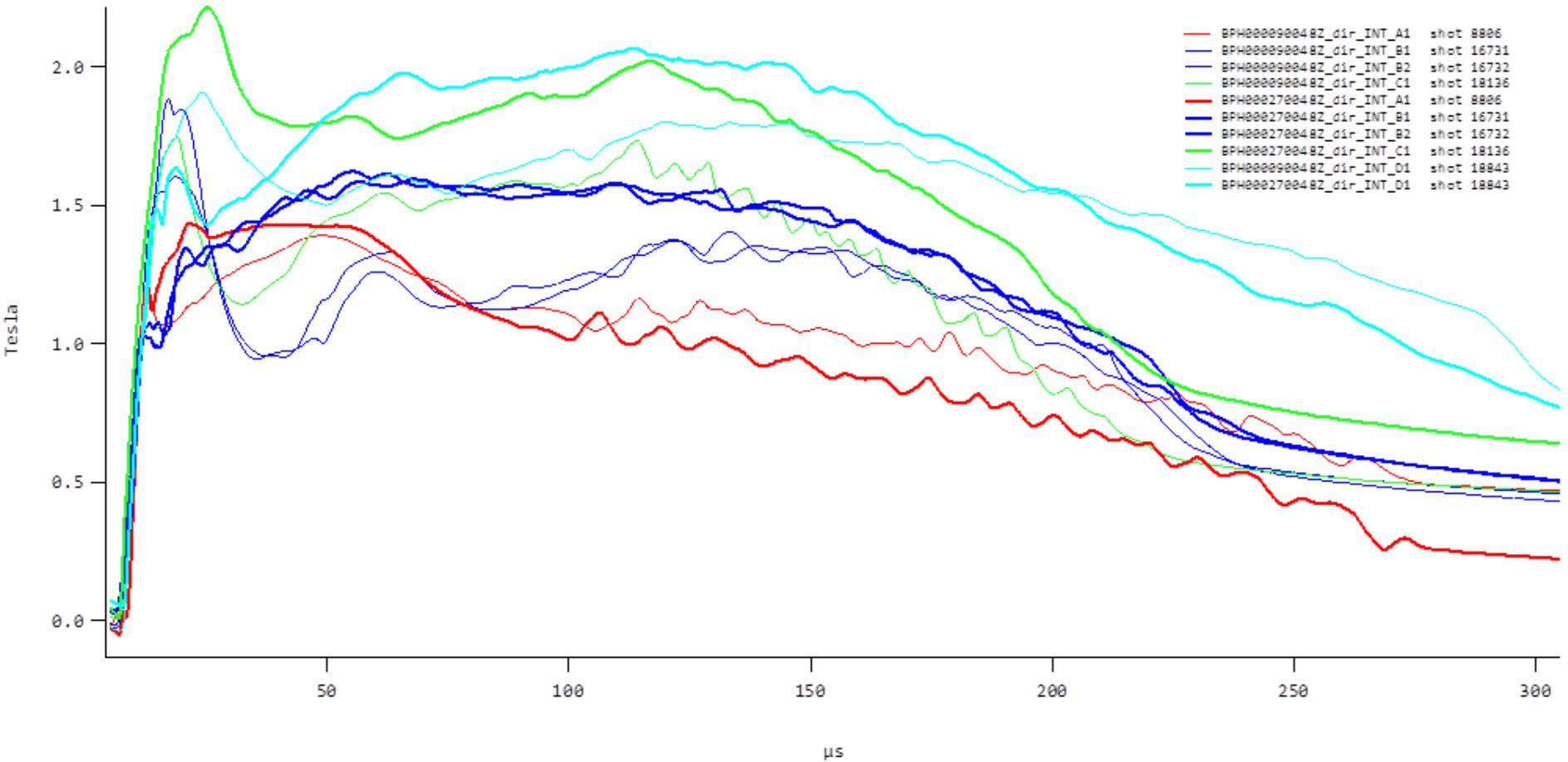
Modified "Chalice" Shape



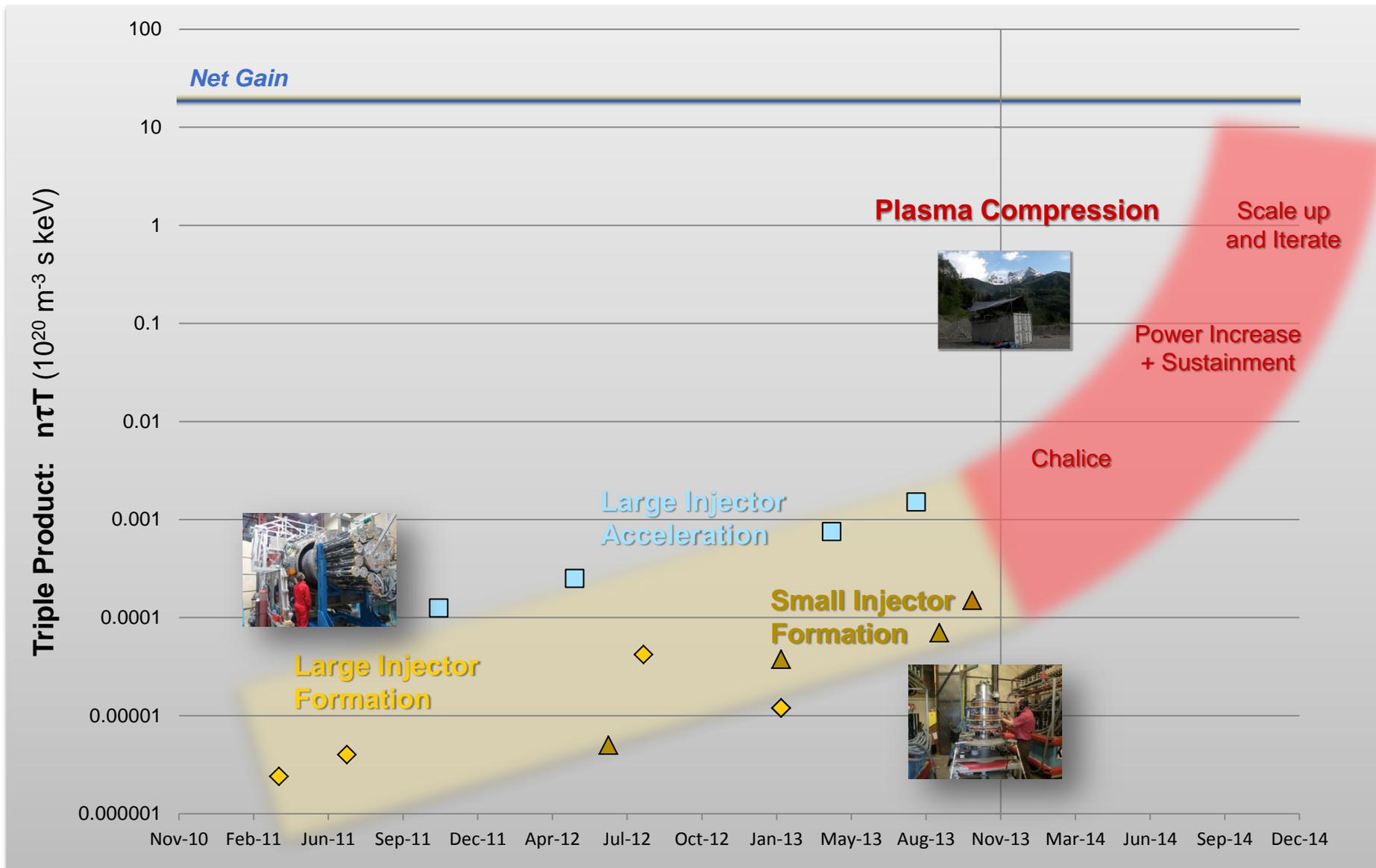
Chalice Shape: Tilt Stable



Small Injector Plasma Improvement: December, 2013



The Path Forward: 2014



Clean energy.
Everywhere.
Forever.



generalfusion

Doug Richardson

CEO

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