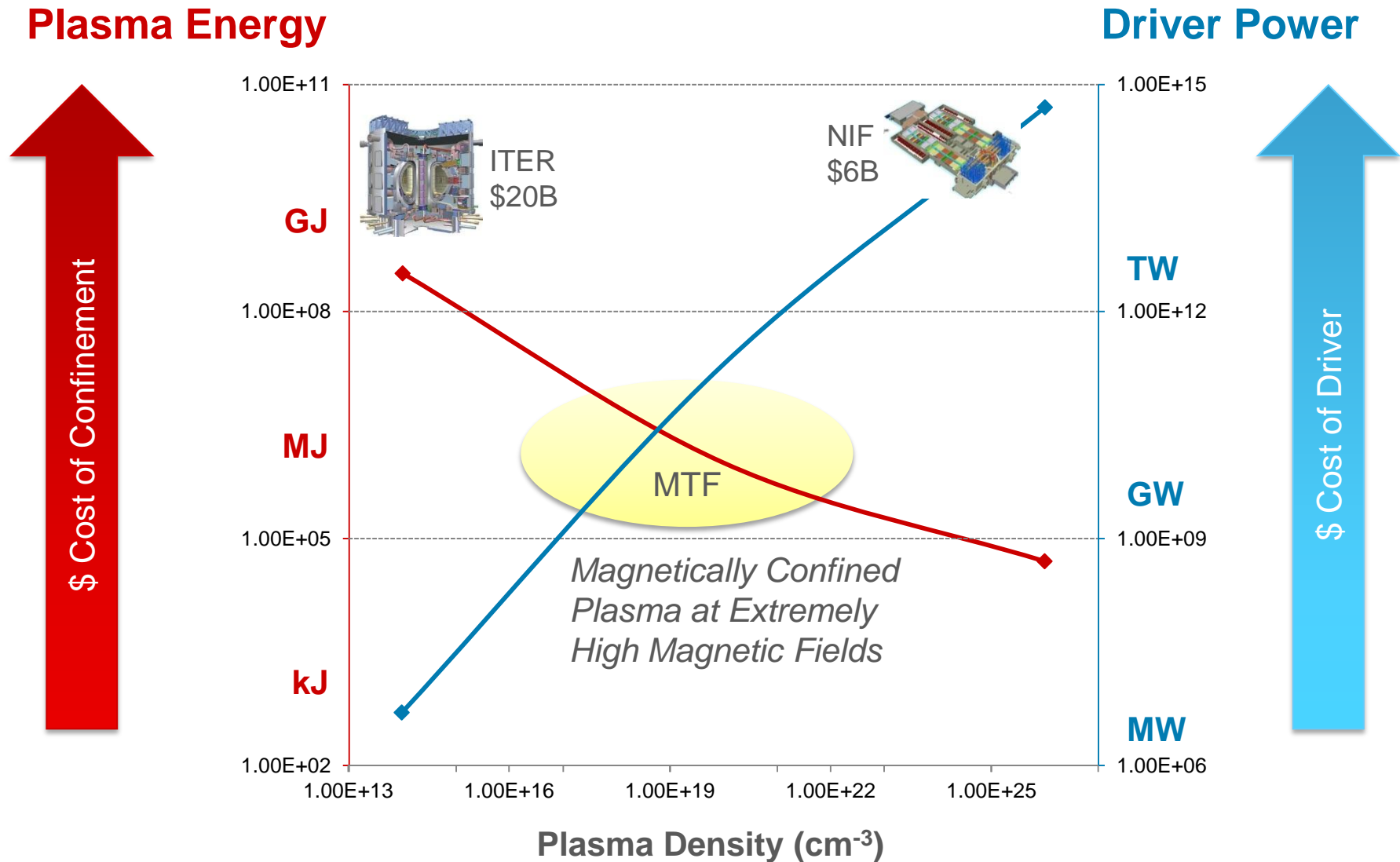




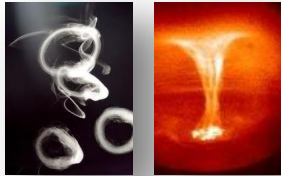
General Fusion

A Middle Ground?

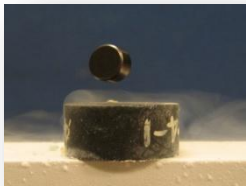


Magnetized Target Fusion

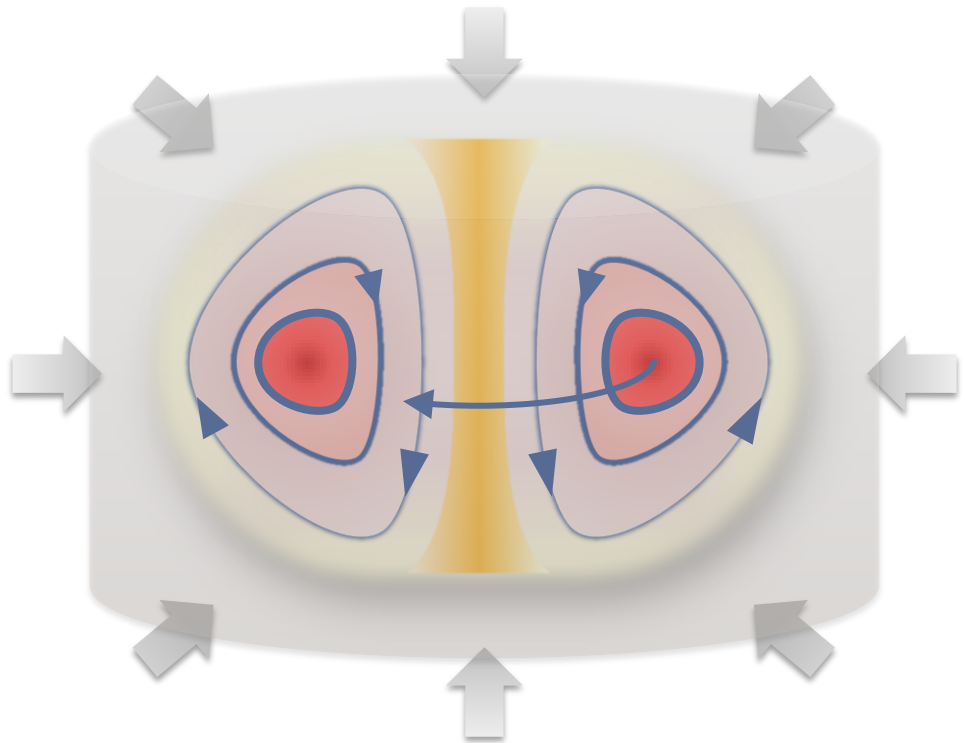
1. Form a compact torus of plasma



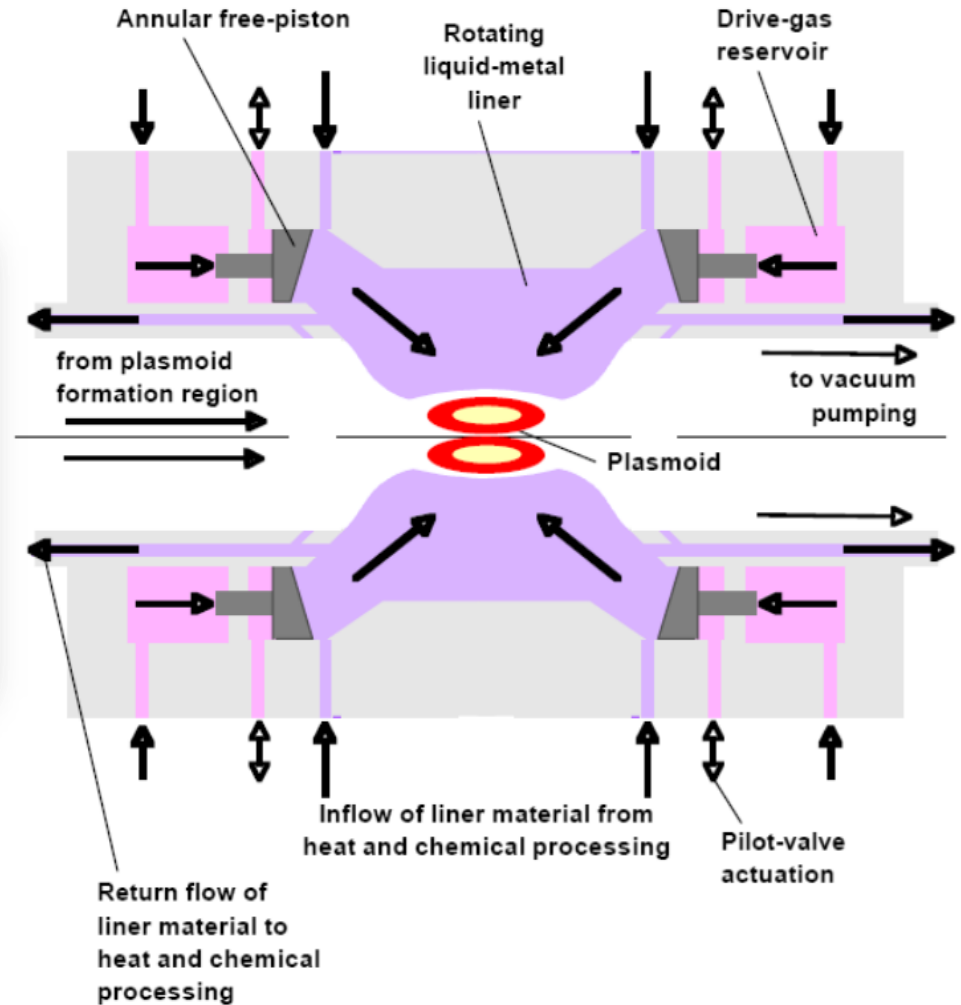
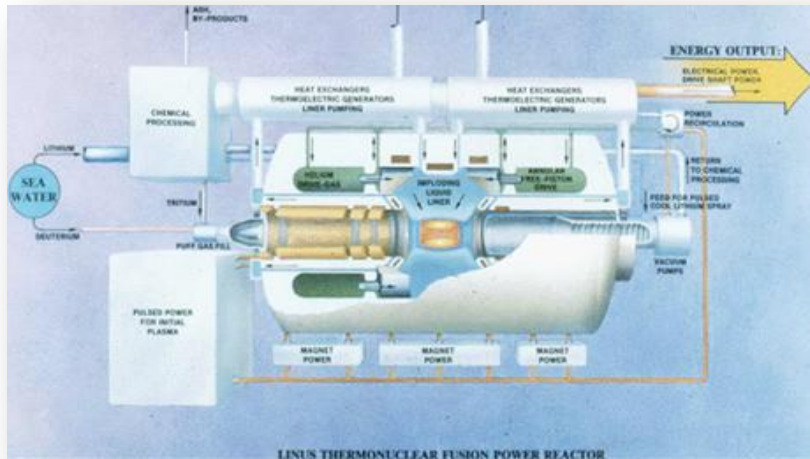
2. Confine in conductive chamber



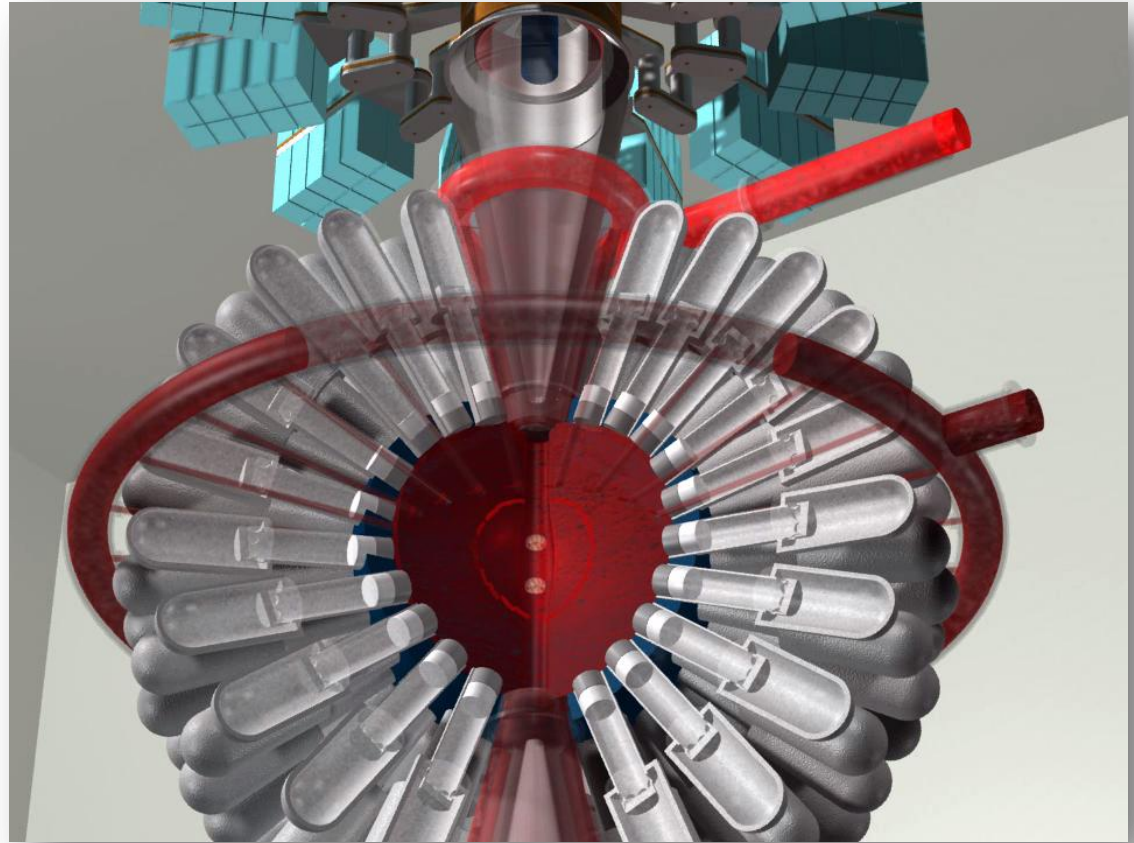
3. Compress and heat to fusion conditions
4. Repeat (pulsed system)



LINUS – Naval Research Laboratory, 1976



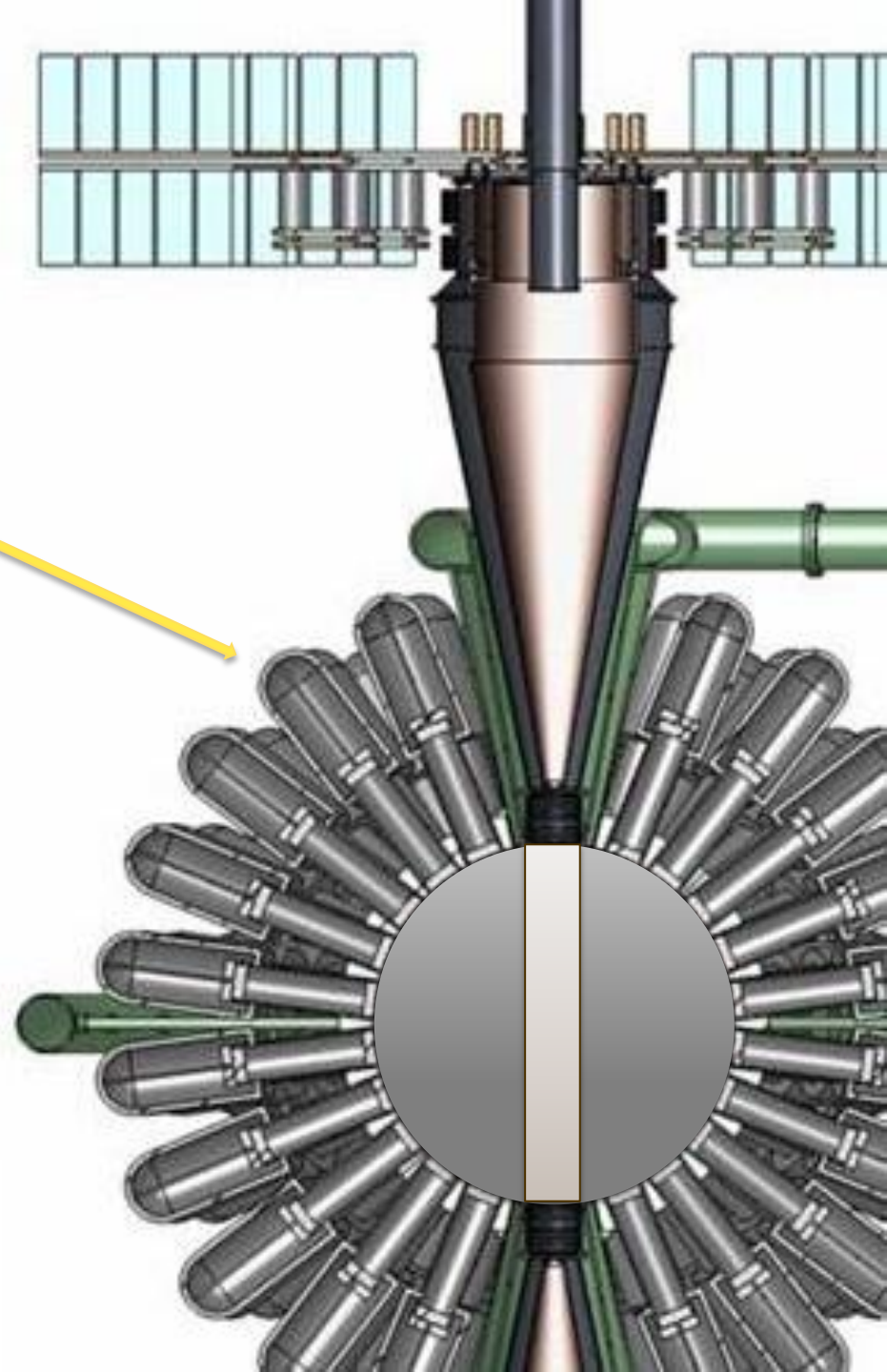
General Fusion's Acoustically Driven MTF



Practical

Compressed gas driver

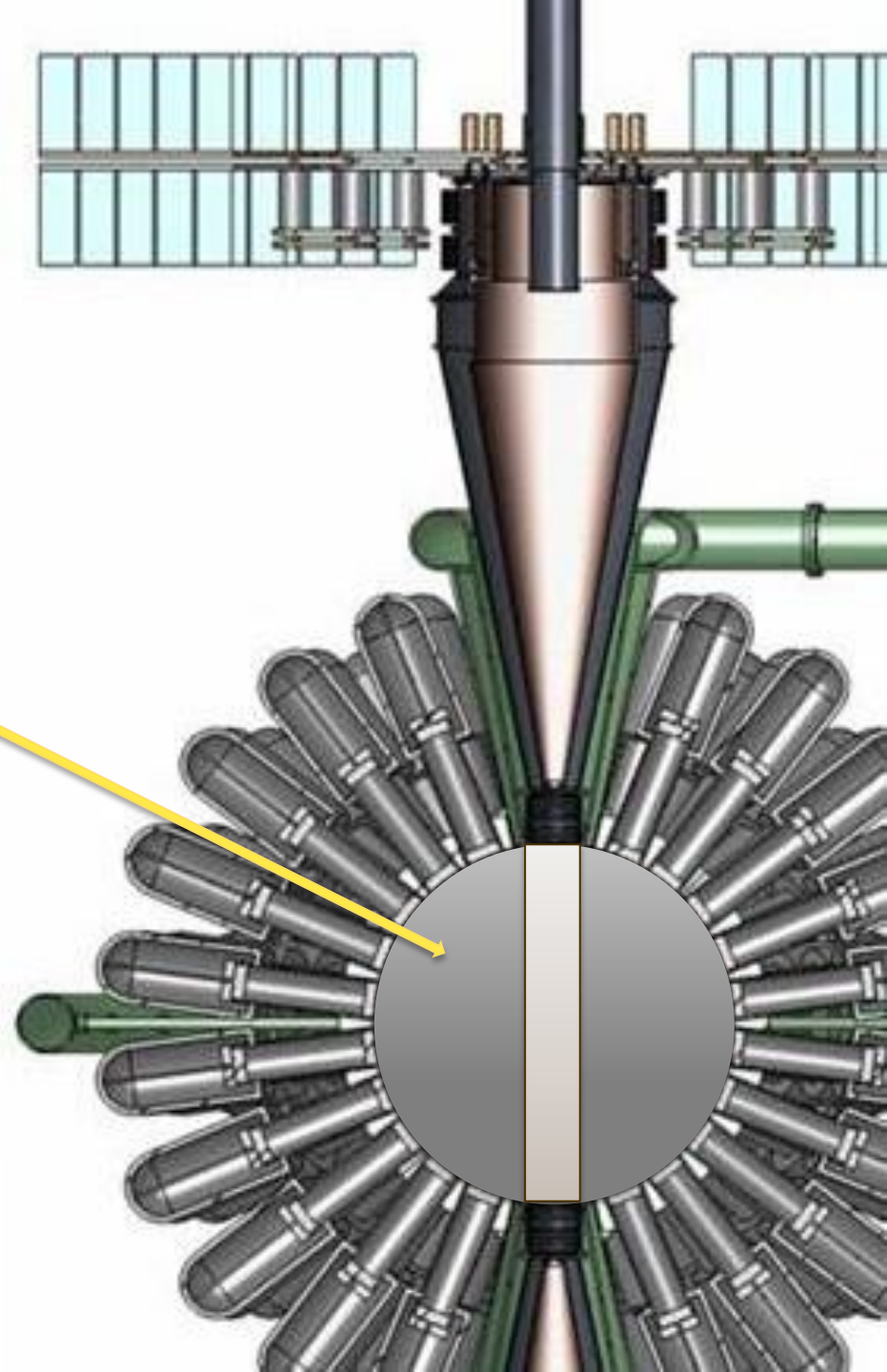
- Uses power plant working fluid
- Baseline steam, could be CO₂ or Helium
- Low cost for high energy: <\$0.2/J compared to >\$2/J for pulsed power



Practical

Thick Lead-Lithium blanket

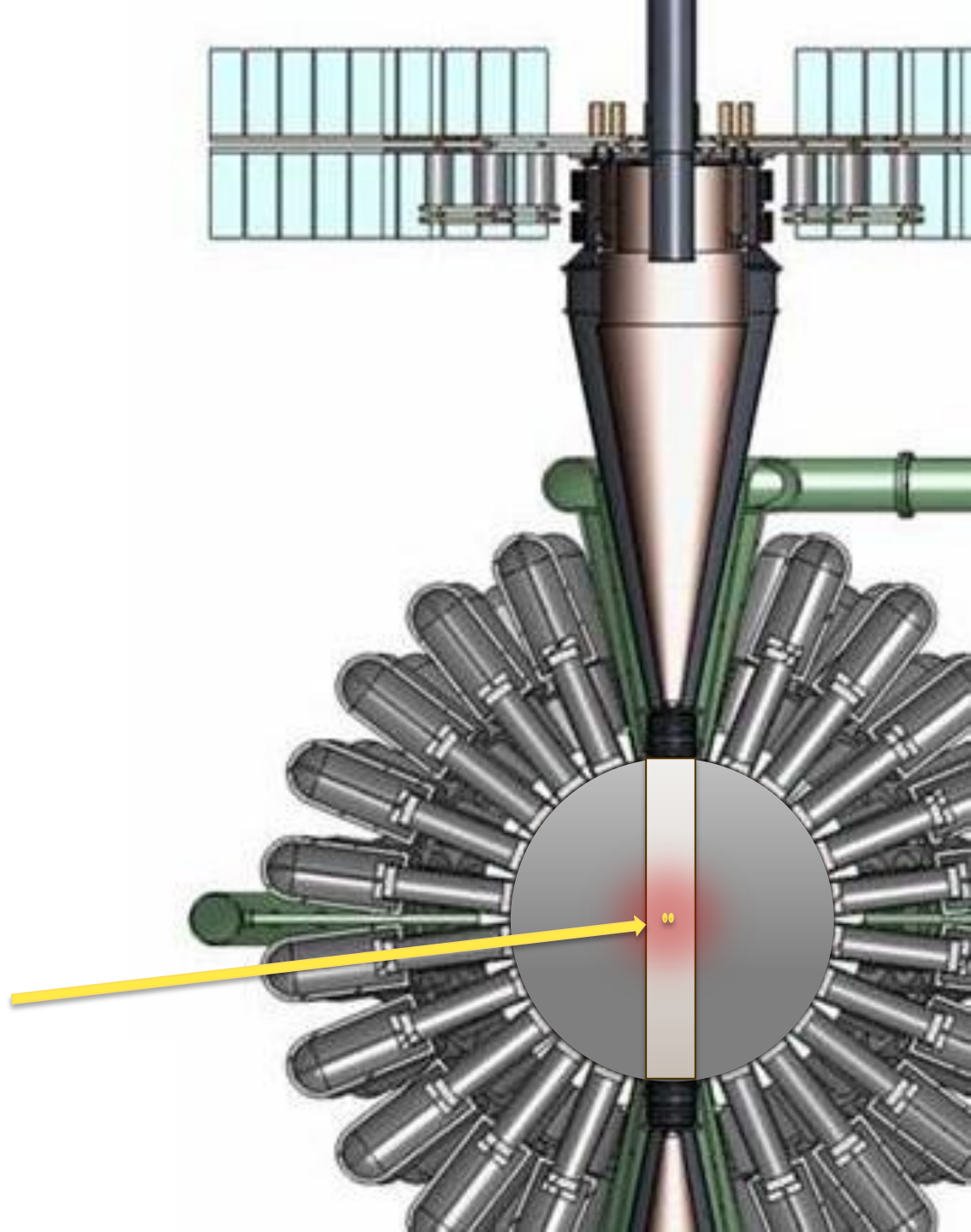
- 300 °C inlet temperature
- 550 °C outlet temperature
- 2 m³/s flow rate
- 2 MeV+ neutron flux to structure is **5 orders of magnitude** lower than ITER
- 4π coverage, n,2n Pb reaction provides tritium breeding ratio of **1.5**



Practical

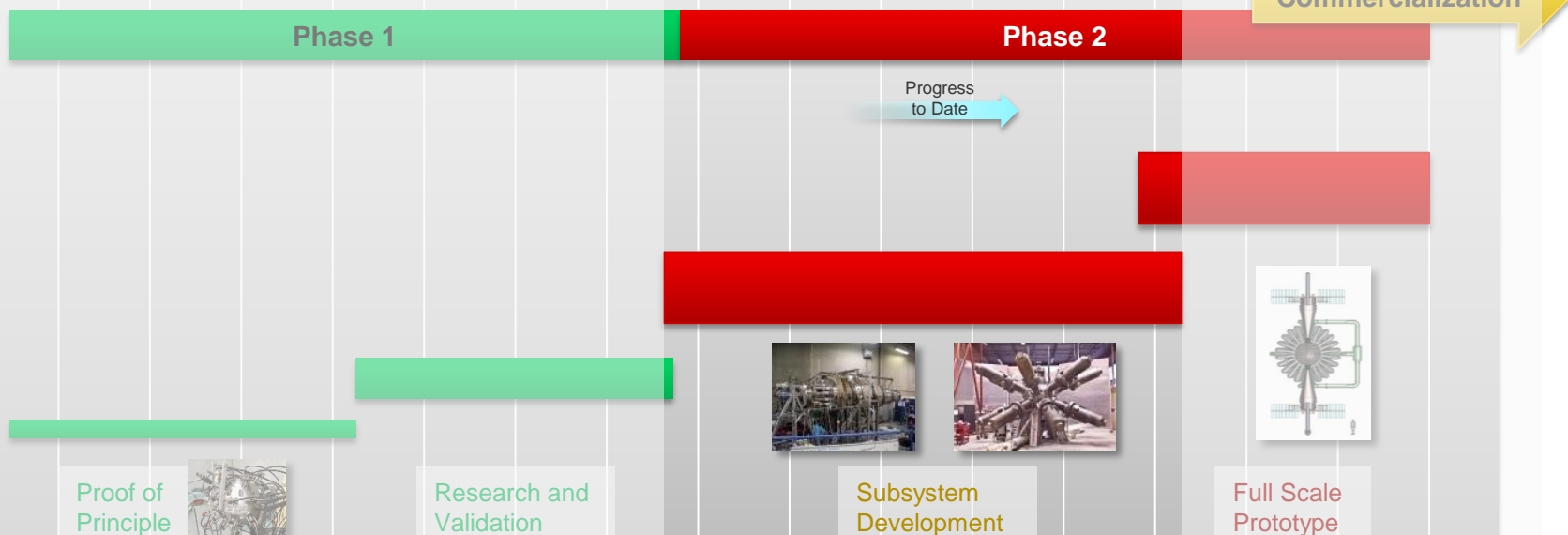
Plasma target

- Liquid wall cannot be destroyed
- Target is plasma only
- Provides a pulsed system with no consumables

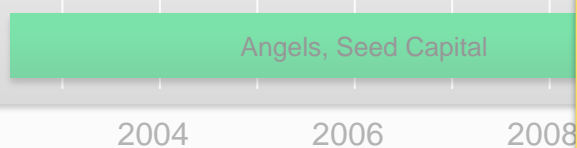


Research and Development Plan

Technology Development Phases



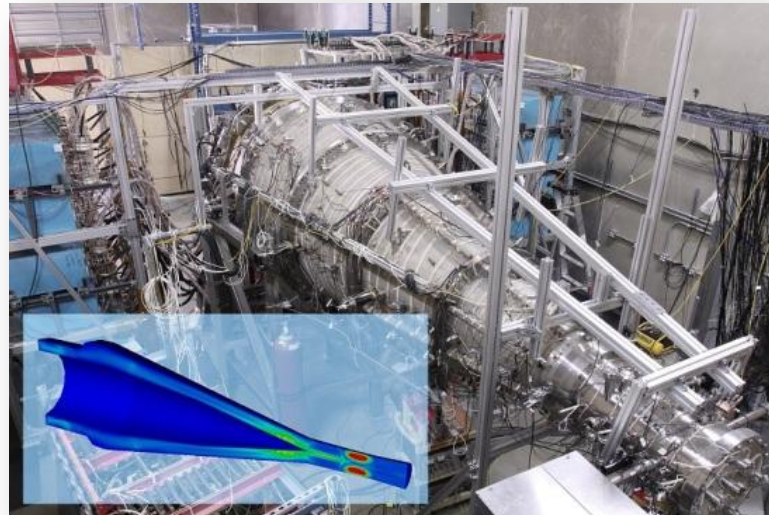
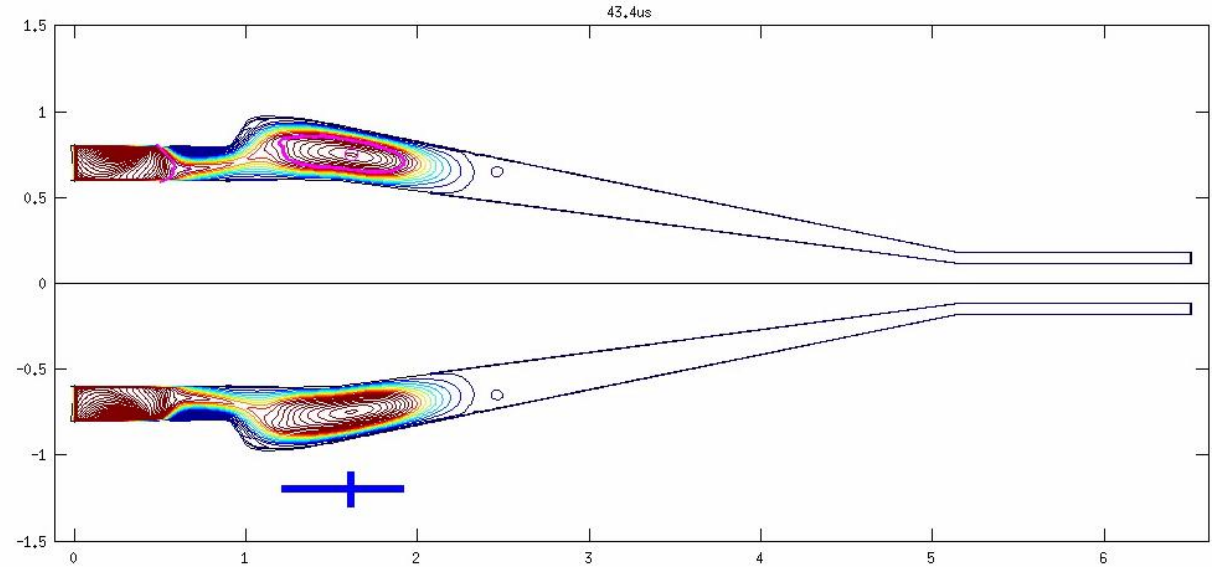
Financing Phases



- ➡ Full Scale Plasma Injector
- ➡ Full Scale Pistons
- ➡ Pb Vortex and 14 Piston Sphere
- ➡ Matching Simulations
- ➡ Plasma Compression Tests

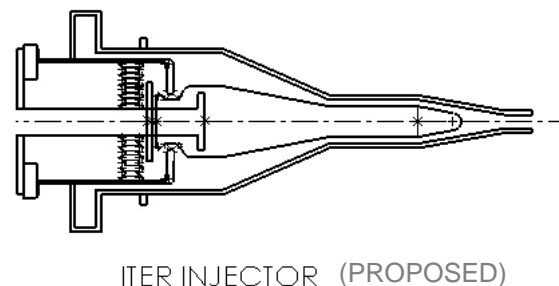
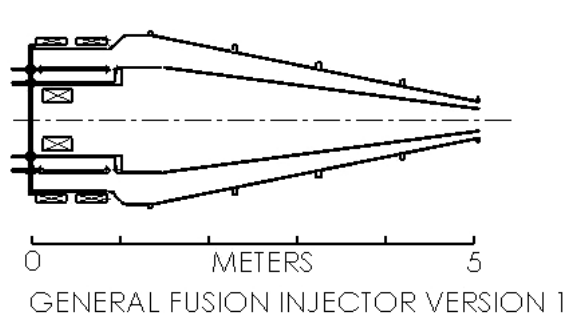
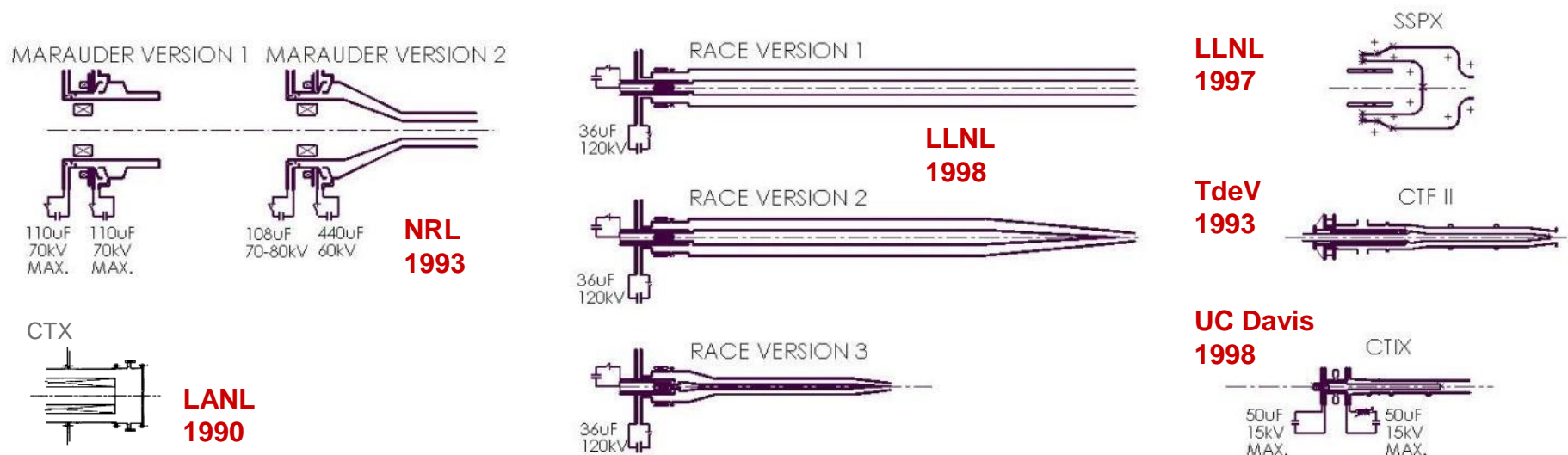
2018

Plasma Injector Simulation



Plasma Injector Heritage

Scale comparison of previously constructed CT accelerators
With GF's plasma injector design



**Largest Plasma Injectors
ever built**

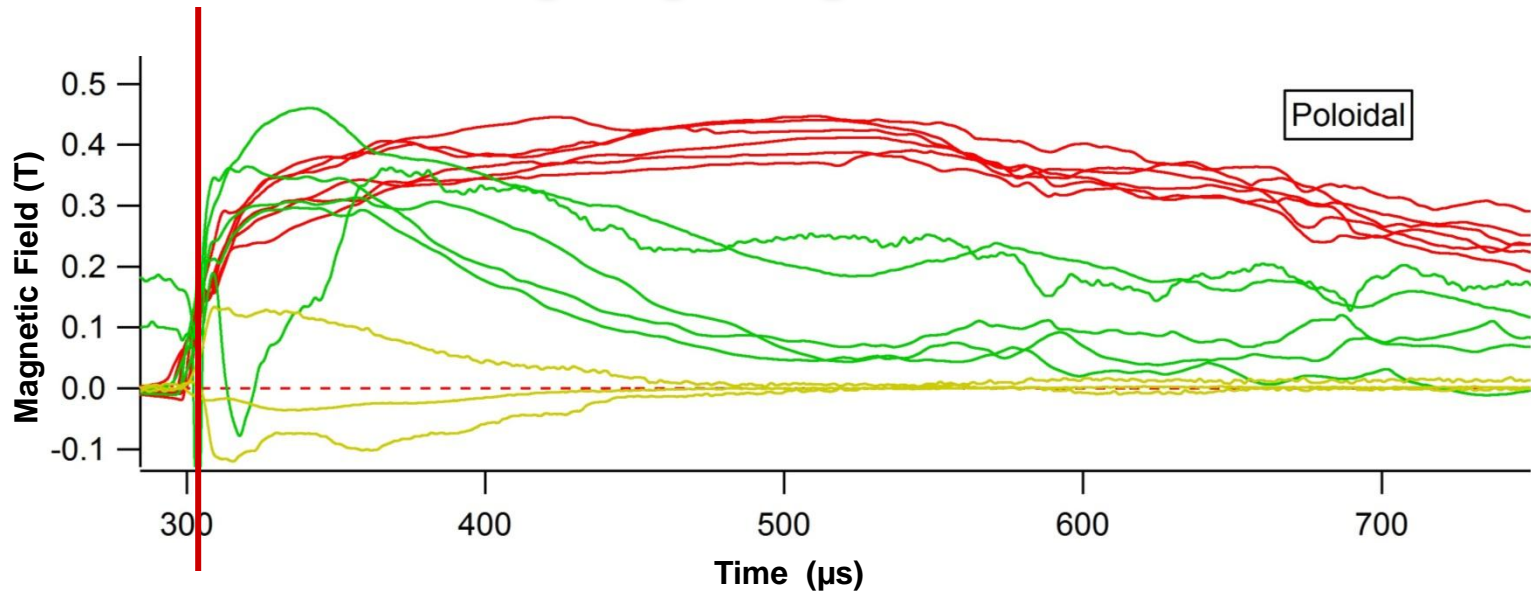
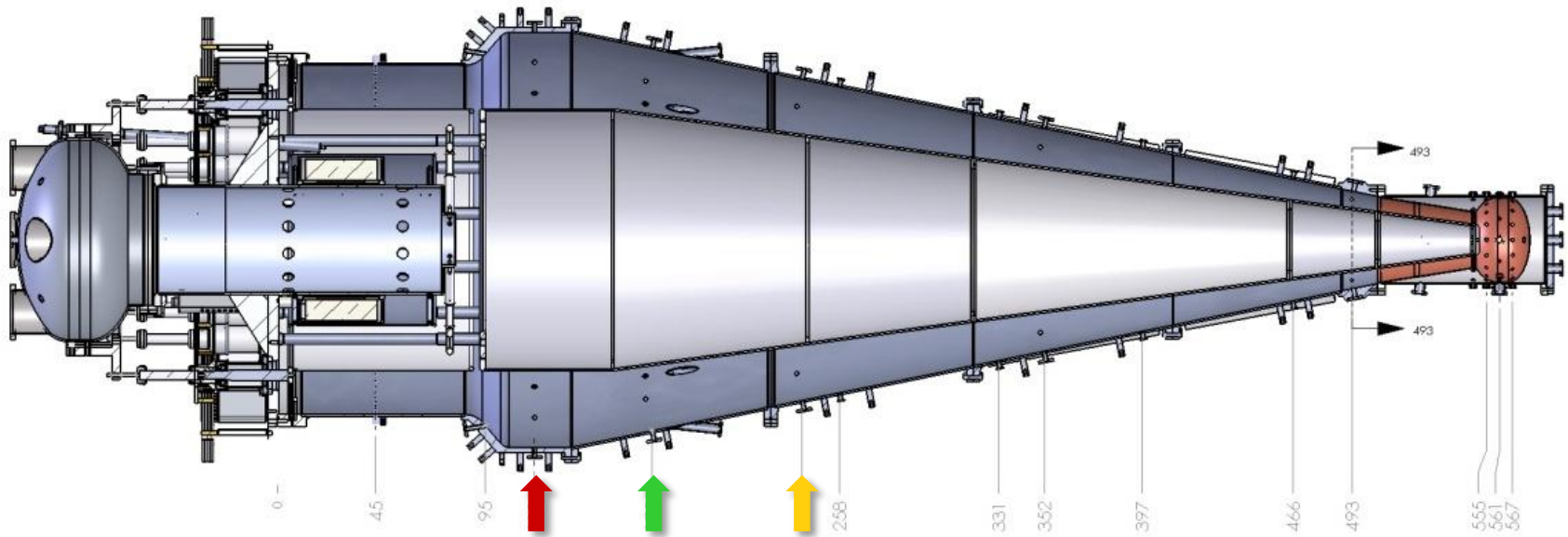
**Record spheromak
plasma energy (~100 kJ)**

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

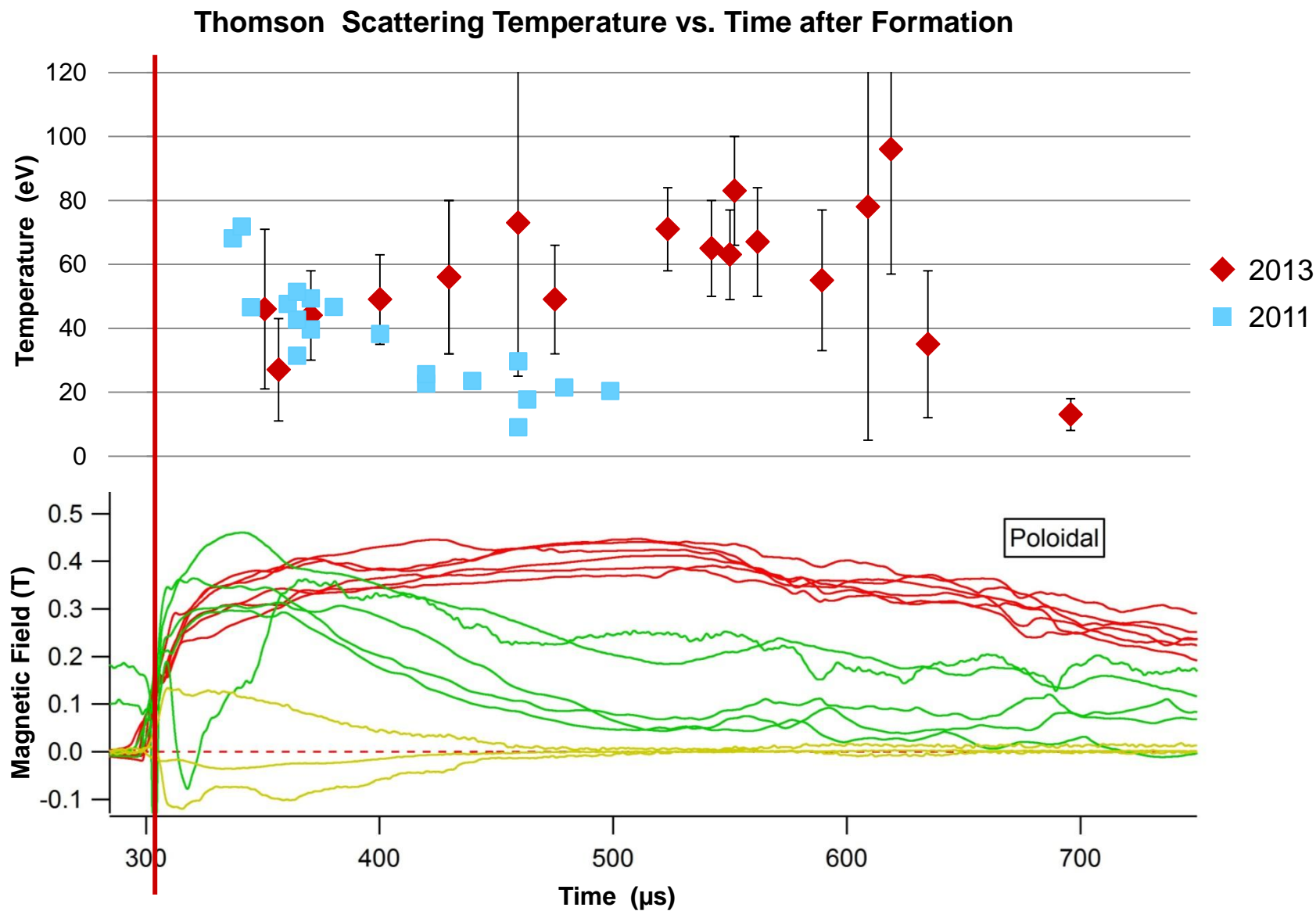
Density of 10^{16} cm^{-3}



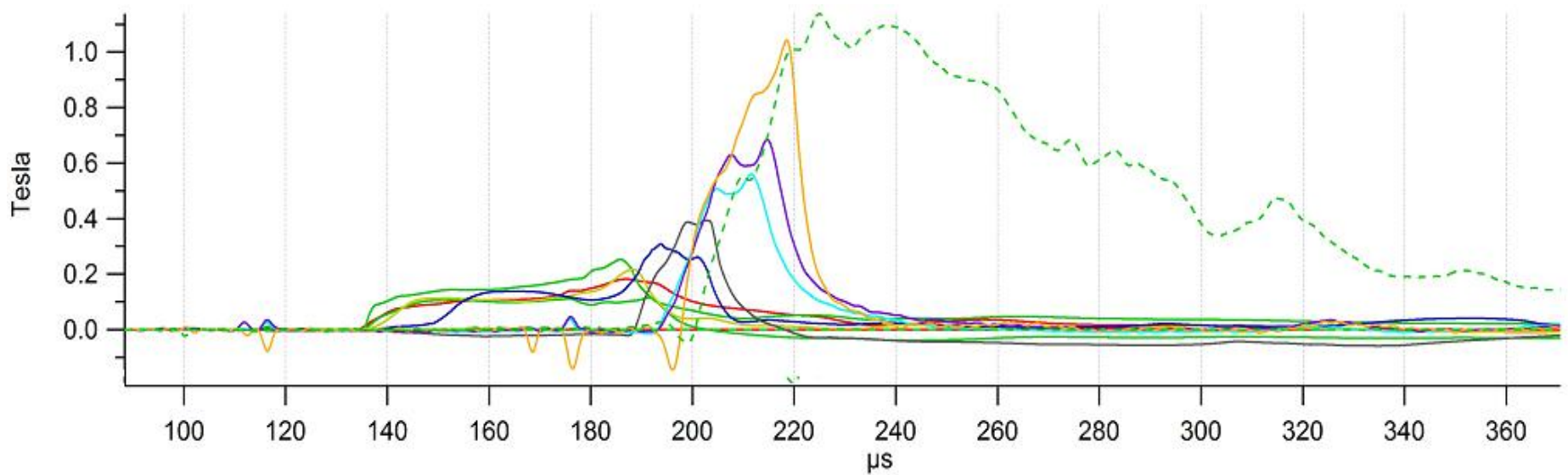
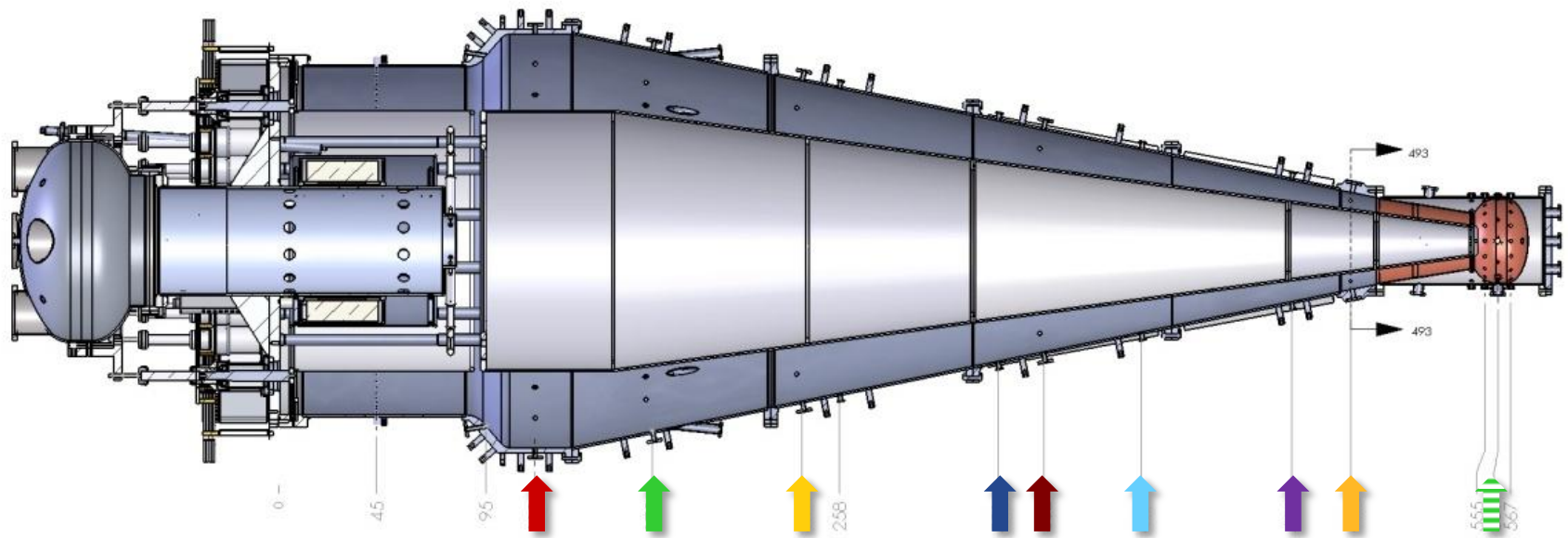
Plasma Formation

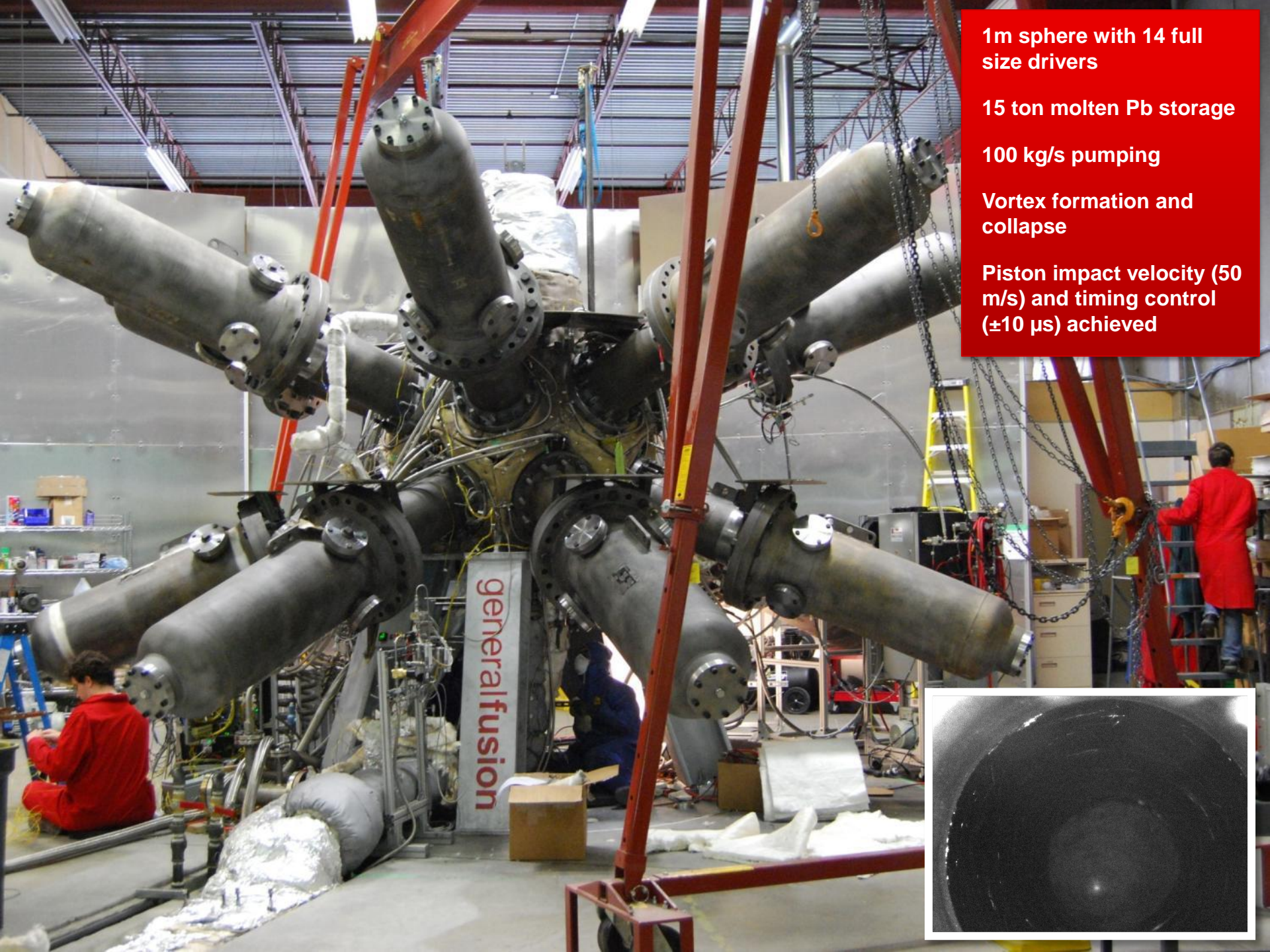


Plasma Formation



Plasma Acceleration





1m sphere with 14 full size drivers

15 ton molten Pb storage

100 kg/s pumping

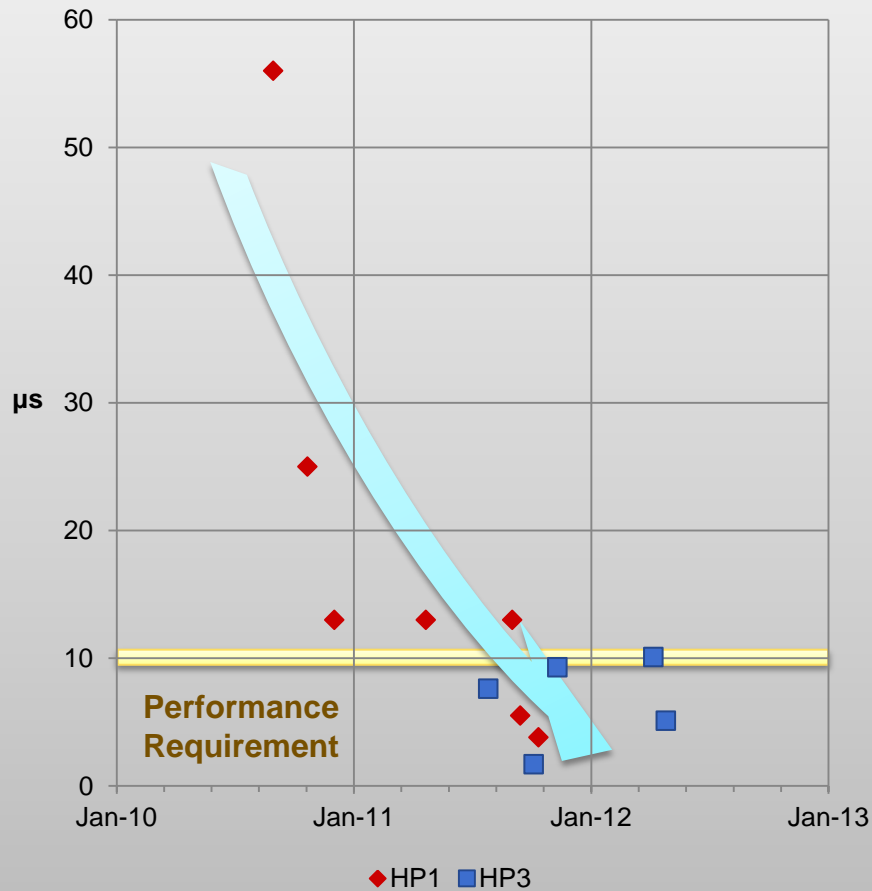
Vortex formation and collapse

Piston impact velocity (50 m/s) and timing control ($\pm 10 \mu\text{s}$) achieved

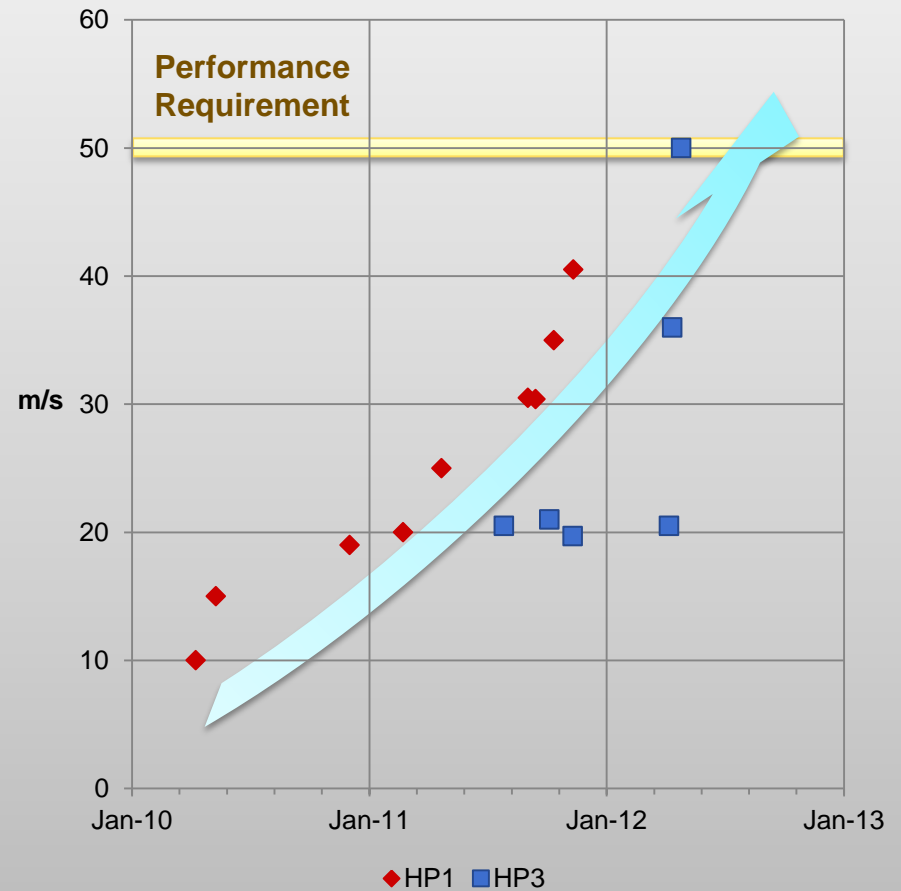


Acoustic Driver Milestones Met ✓

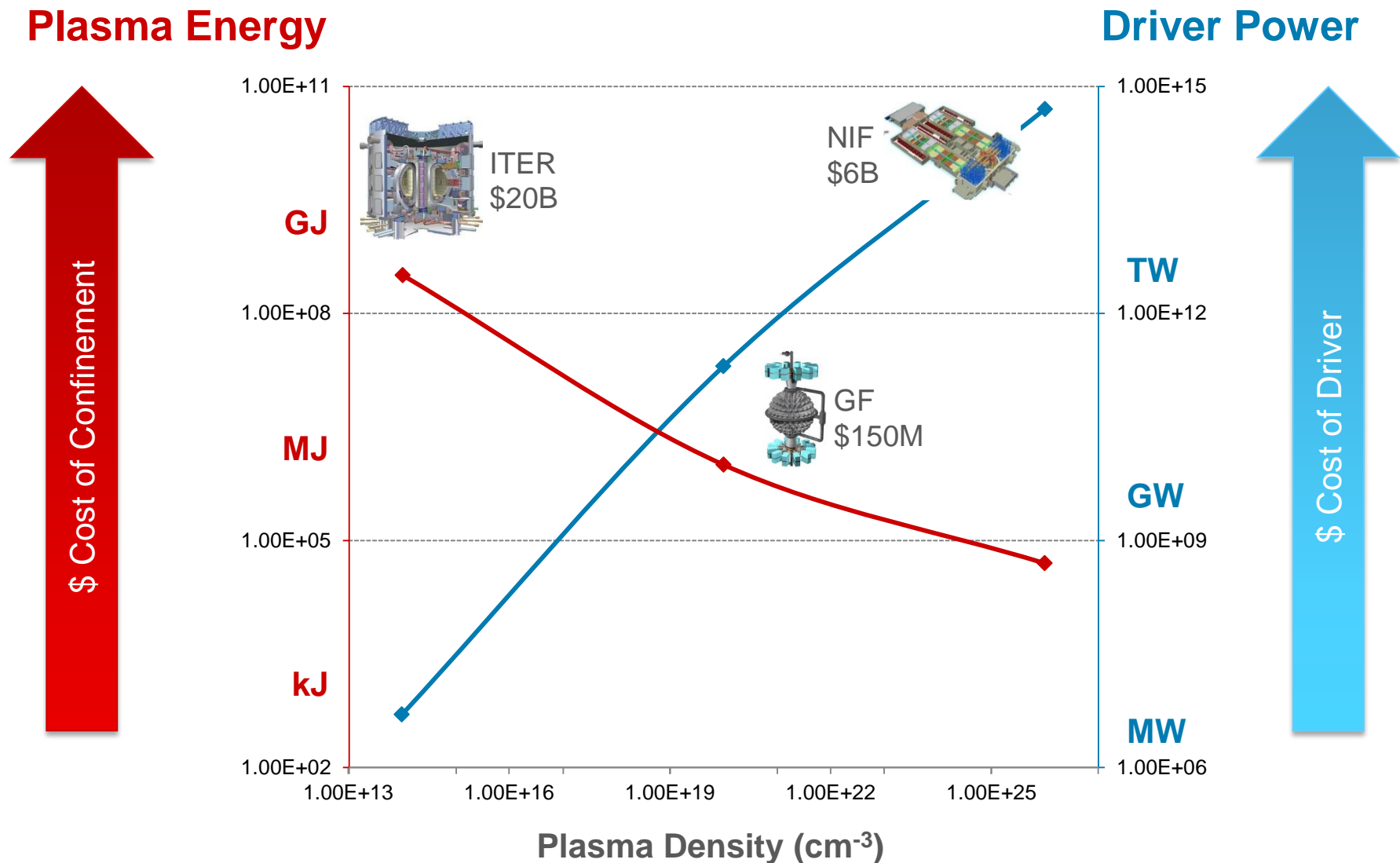
Piston Impact Timing Control (5 sequential shots)



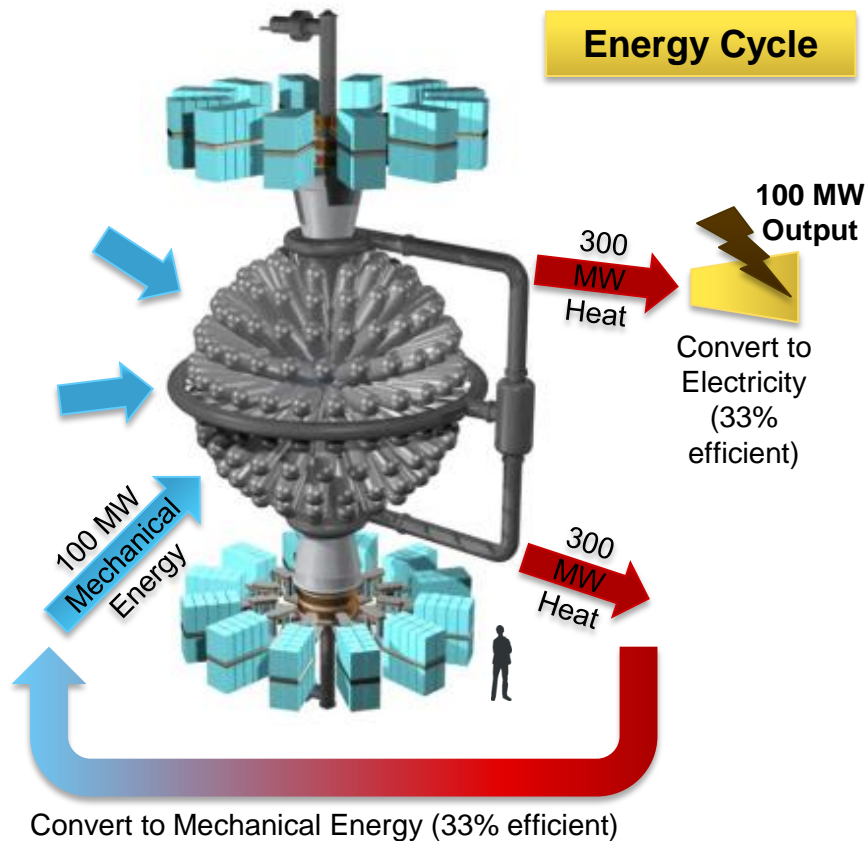
Piston Impact Velocity



Fusion Technologies



Economics



- Baseline 100 MWe power plant
 - 100 MWe modular plant is easier to fund
 - Flexible with existing transmission infrastructure
- Capital cost of plant: ~\$1,900/kW
- Generation cost: ~\$0.03/kWh
 - Fuel only \$0.00001/kWh
 - Uses deuterium (18 kg/yr) & lithium (60 kg/yr)
- Levelized cost: ~\$0.07/kWh
- Balance of plant similar to coal generation
- Reactors can be combined for larger output
- Variable output suitable for load following

Magnetized Target Fusion

1. It can work
2. It can be tested quickly, at full scale, for reasonable \$
3. It's a practical route to a power plant
4. Its commercial system size and economics are attractive

Clean energy.
Everywhere.
Forever.



generalfusion

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