



Princeton Plasma Physics Laboratory and the Fusion Industry

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National Need – Commercial Fusion

- **\$1B private investment in fusion in 5 years. Injection of ideas and enthusiasm. Realizing the NAS vision requires working with private sector**
- **PPPL is supporting new FES program INFUSE to enable companies to benefit from the National Lab**
- **Working to develop a public-private funded innovative concept at PPPL. We are not going to simply watch others do it!**

What can we, a national lab do for the fusion industry?



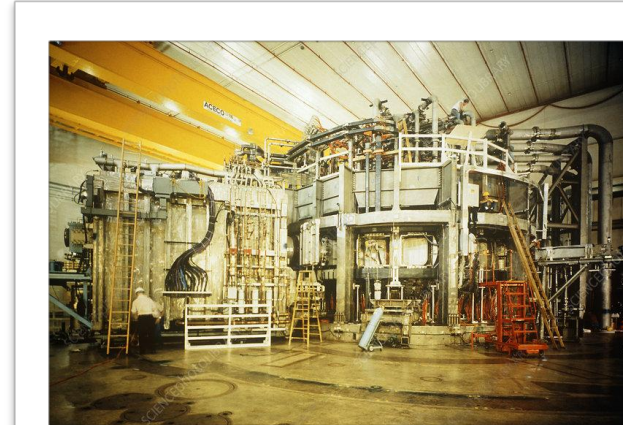
Supporting the Industry

- **National lab could provide: (PPPL capabilities)**
 - Physical facilities:
 - Electrical power: fast (2.2GJ - seconds) and slow power supplies (50MW steady).
 - Cryogenics: liquid helium (1kW @4.5K), nitrogen (11000 gallons) .
 - Cooling water. (MWs)
 - Radio frequency power: microwaves. (5-7MW @MHz)
 - Diagnostics: lasers, x-rays, microwaves.
 - Tritium handling.
 - Expertise, consultancy
 - Design engineering capability (Virtual engineering)
 - Safety expertise (Electrical, radiation)
 - Fusion science.(World class)
 - Modelling and high performance computing



Supporting the Industry

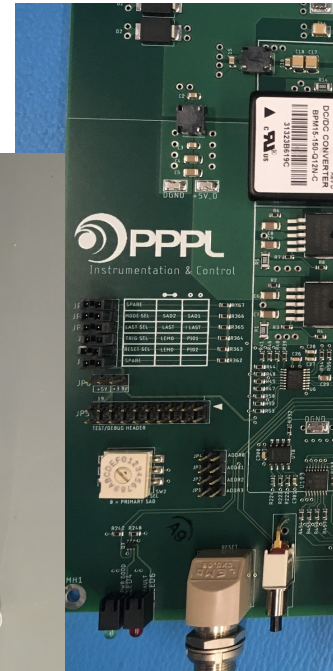
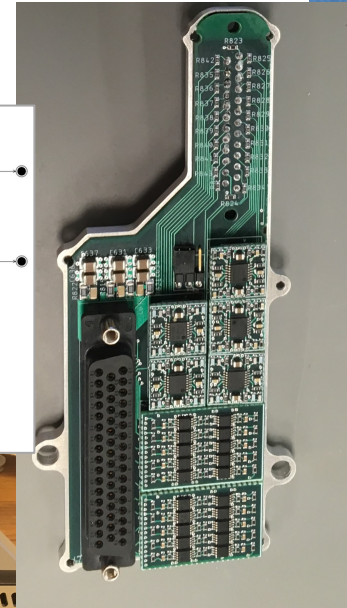
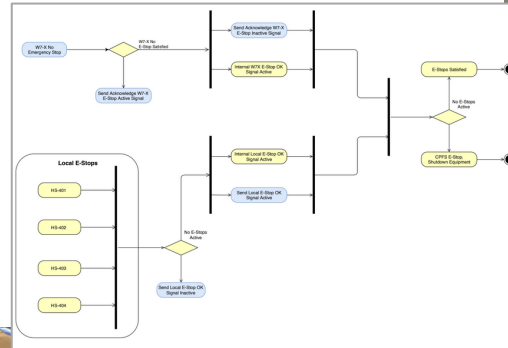
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Supporting the Industry

Advanced Instrumentation and Control capability

- Custom Electronics
- Real-time capable Diagnostic systems
- Machine Protection Systems
- Prototype development
- Process control systems
- Software Design



Facility Needs Drive Long-Term Campus Plan



1

Engineering Center (2018)

2

FLARE User Facility (2021)

3

Compact Permanent Magnet Stellarator (2023)

4

Home for new private ventures?

5

Future Liquid Lithium Lab (2023)

6

Princeton Plasma Innovation Center (PPIC) (2025)

- Modern medium bay laboratories for large and precision research needs
- Remote Participation and Collaboration center external experiments
- State-of-the-art visualization center for leveraging Exascale computing

6

Next large fusion experiment (2030) (Private Public Partnership?)



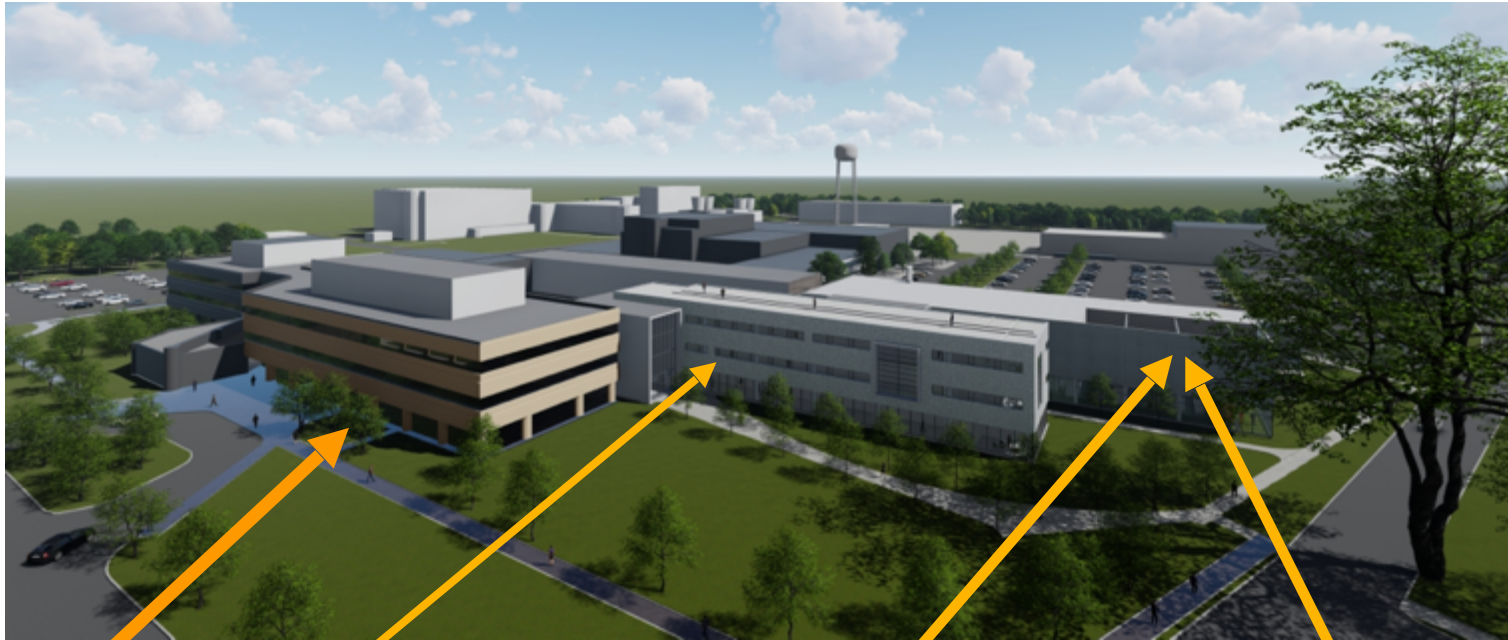
New Computer Facilities



- **Princeton University to fund and manage new computer to enable high performance computing**
 - 1.5 petaflops
 - 7 racks of Summit



Princeton Plasma Innovation Center (P-PIC) Capabilities



LSB West

**Collaboration
Space**

**Visualization and Remote
Participation Room**

**Medium Bay Lab
Space**



PPPL will provide the expertise to facilitate fusion

- **Commercial Fusion will be delivered by private industry**
- **PPPL is open fo an optimal partnership**

Please feel free to contact me: adiallo_at_pppl.gov

