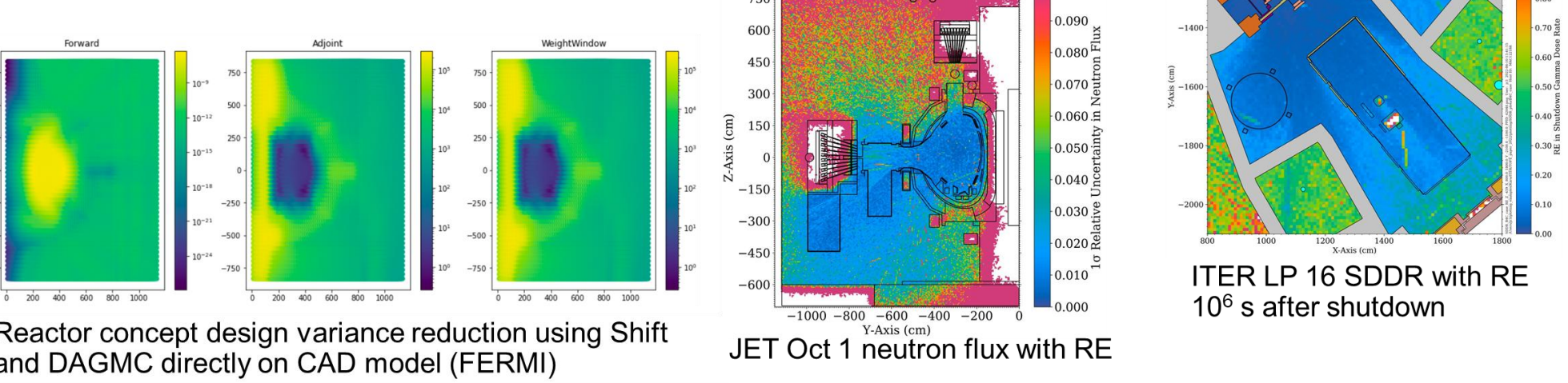


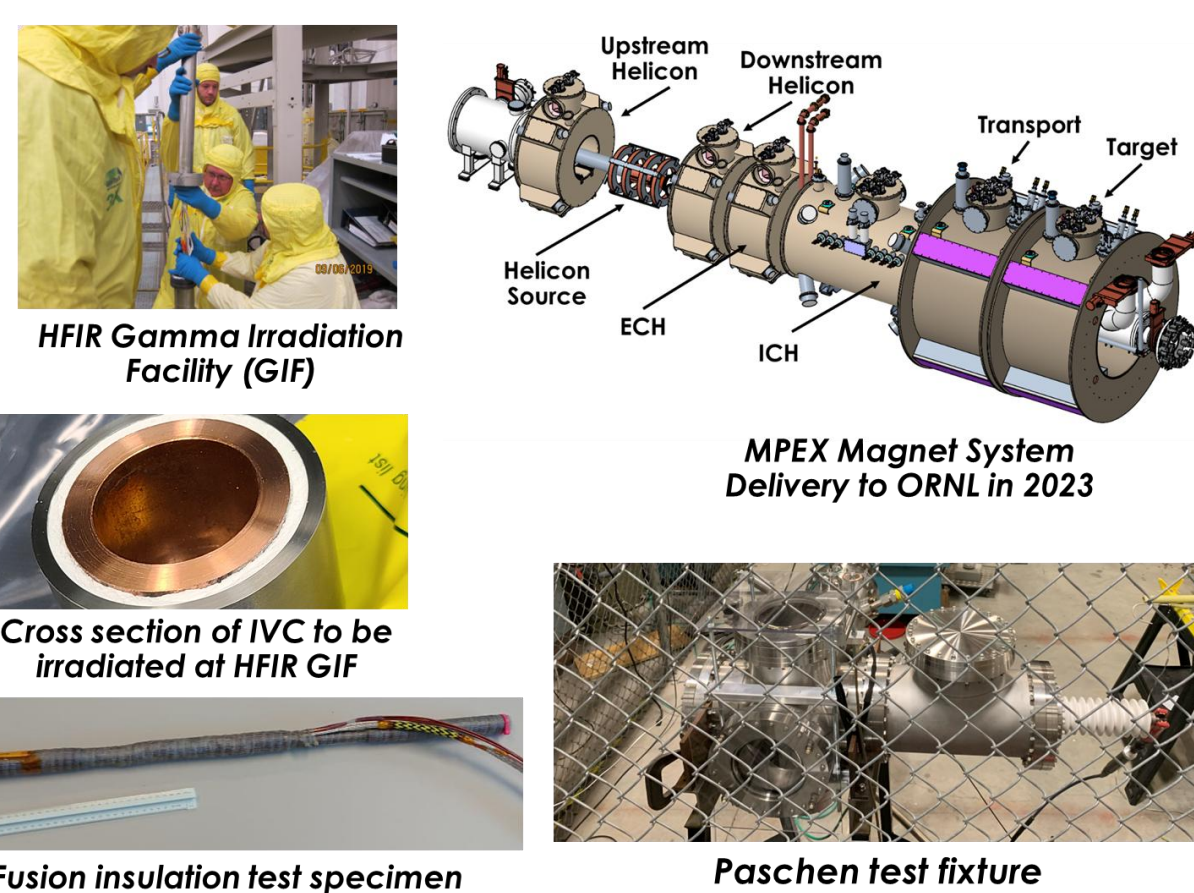
ORNL Fusion Radiation Transport Analysis Capabilities

- **ORCS** for Shutdown Dose Rate (SDDR)
- **ORNL Rigorous Two-Step (R2S) Code Suite**
- **Monte Carlo neutron and photon radiation transport with variance reduction and activation**

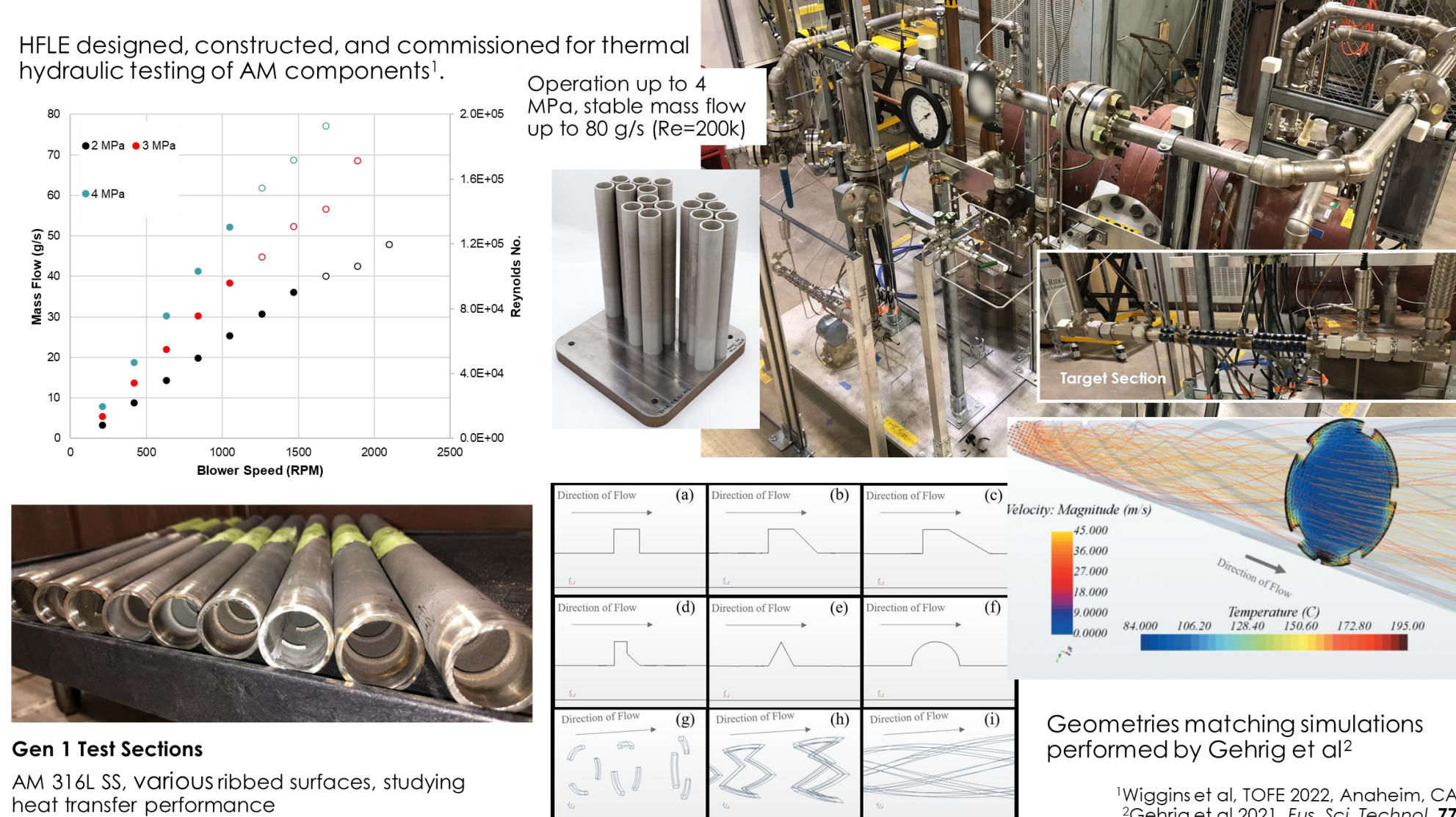


ORNL Enabling Technology – Magnet and Cable Capabilities and R&D

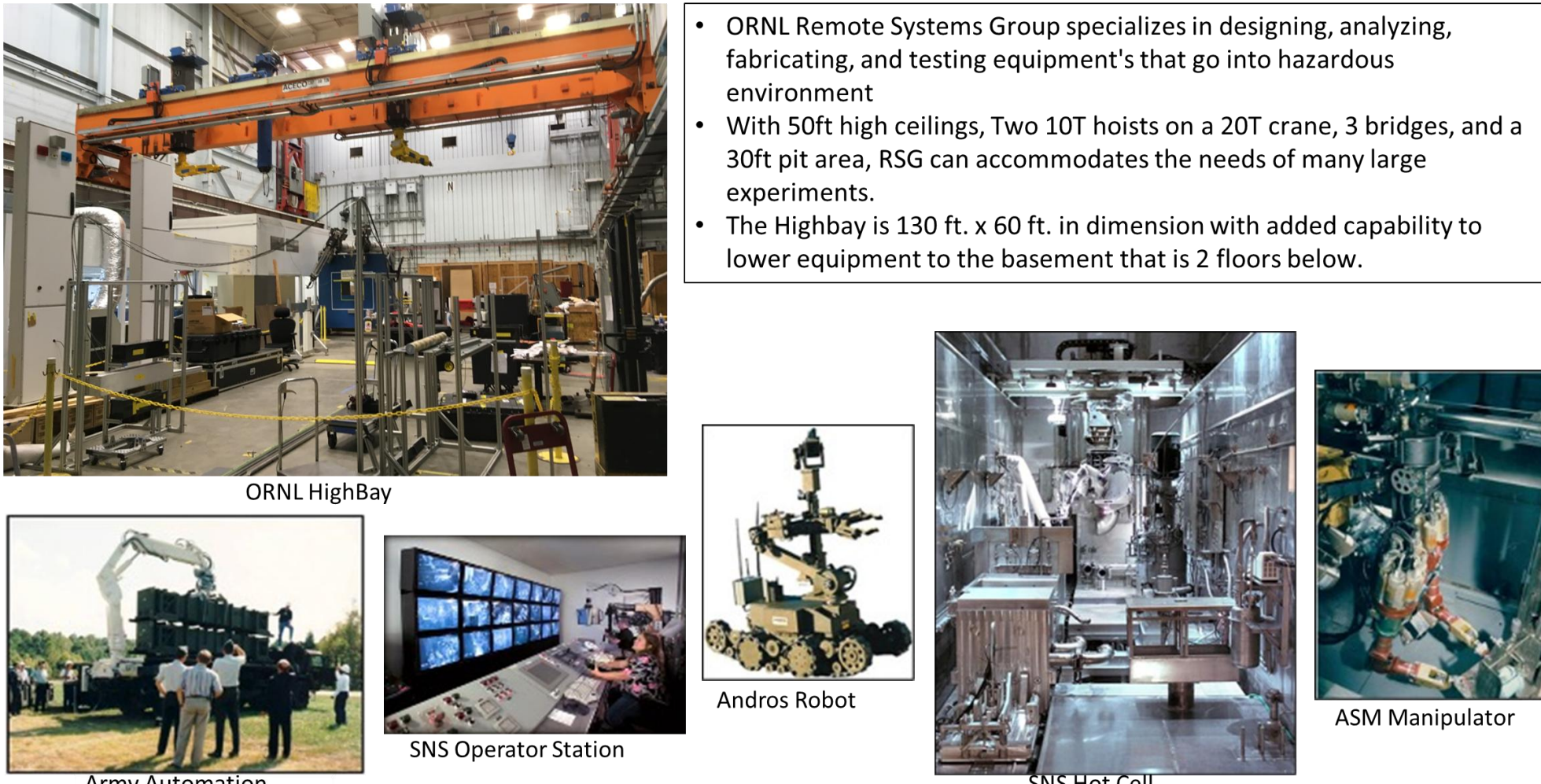
- Working with Tesla Engineering to complete fabrication and acceptance testing MPEX magnet system
- Design support for high-field magnets for plasma separation processing & instrumentation upgrades at SNS
- Irradiation of in-vessel cables for ITER
- Electrical characterization of components for advanced fission and fusion reactor systems
- Gamma irradiation of tritium barriers



Helium Flow Loop Experiment



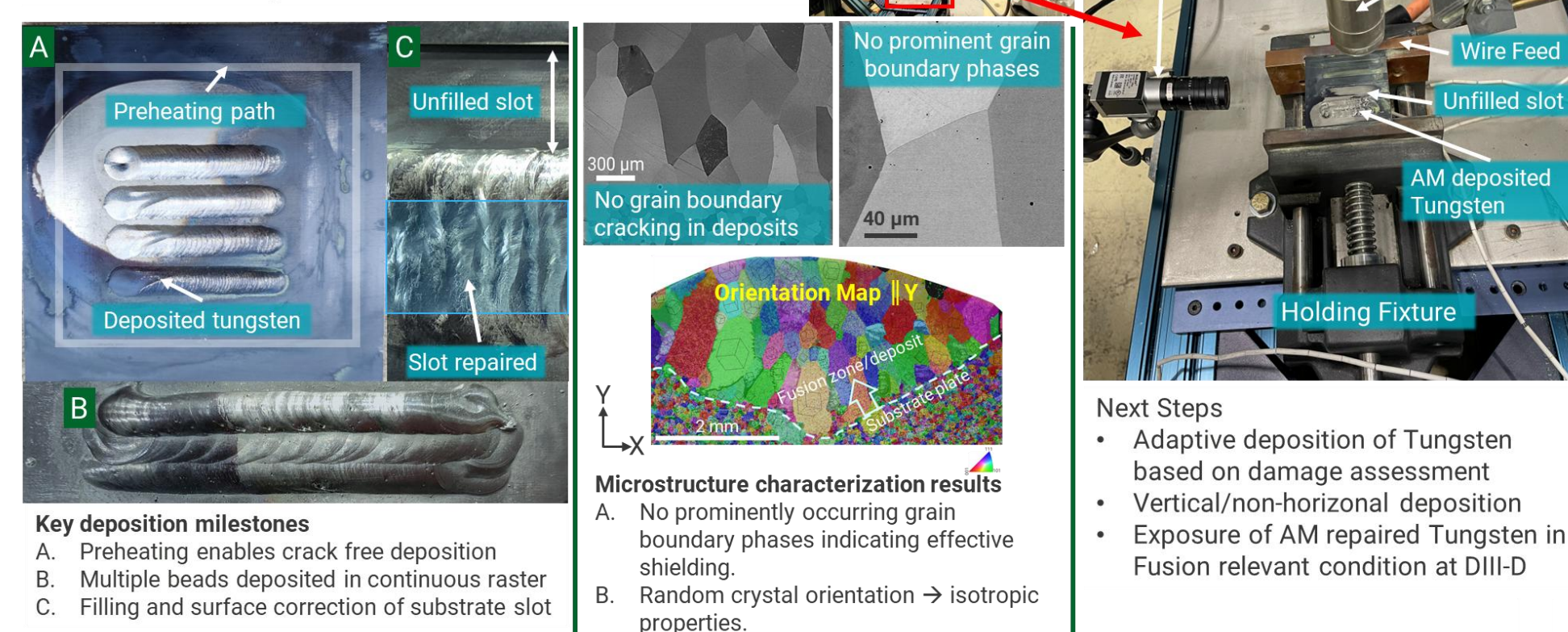
Remote Handling at ORNL



- ORNL Remote Systems Group specializes in designing, analyzing, fabricating, and testing equipment's that go into hazardous environment
- With 50ft high ceilings, Two 10T hoists on a 20T crane, 3 bridges, and a 30ft pit area, RSG can accommodate the needs of many large experiments.
- The Highbay is 130 ft. x 60 ft. in dimension with added capability to lower equipment to the basement that is 2 floors below.

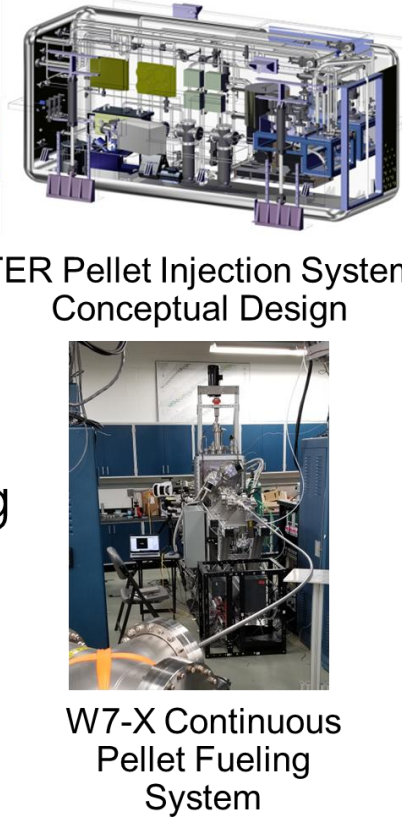
Additive Crack Free Repair of Tungsten Tiles

- Crack free deposition of 99.95% Tungsten on Tungsten
- First wire DED tungsten deposition in the US
- Scalable and flexible technology
- 3400°C Tungsten melting vs 1500°C for steels
- Successful filling of simulated erosion



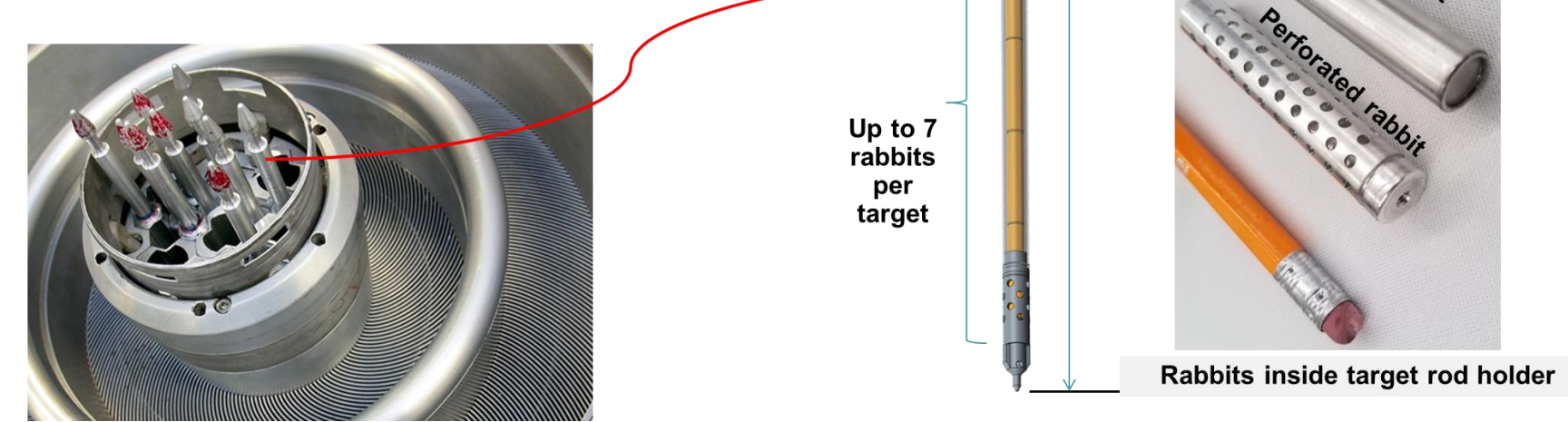
Steady-State Pellet Fueling Systems

- ORNL has been developing a steady-state pellet injector for ITER based on twin-screw extruder (TSE) and gas gun technology.
- A prototype using this same technology is being developed to provide steady-state fueling for W7-X.

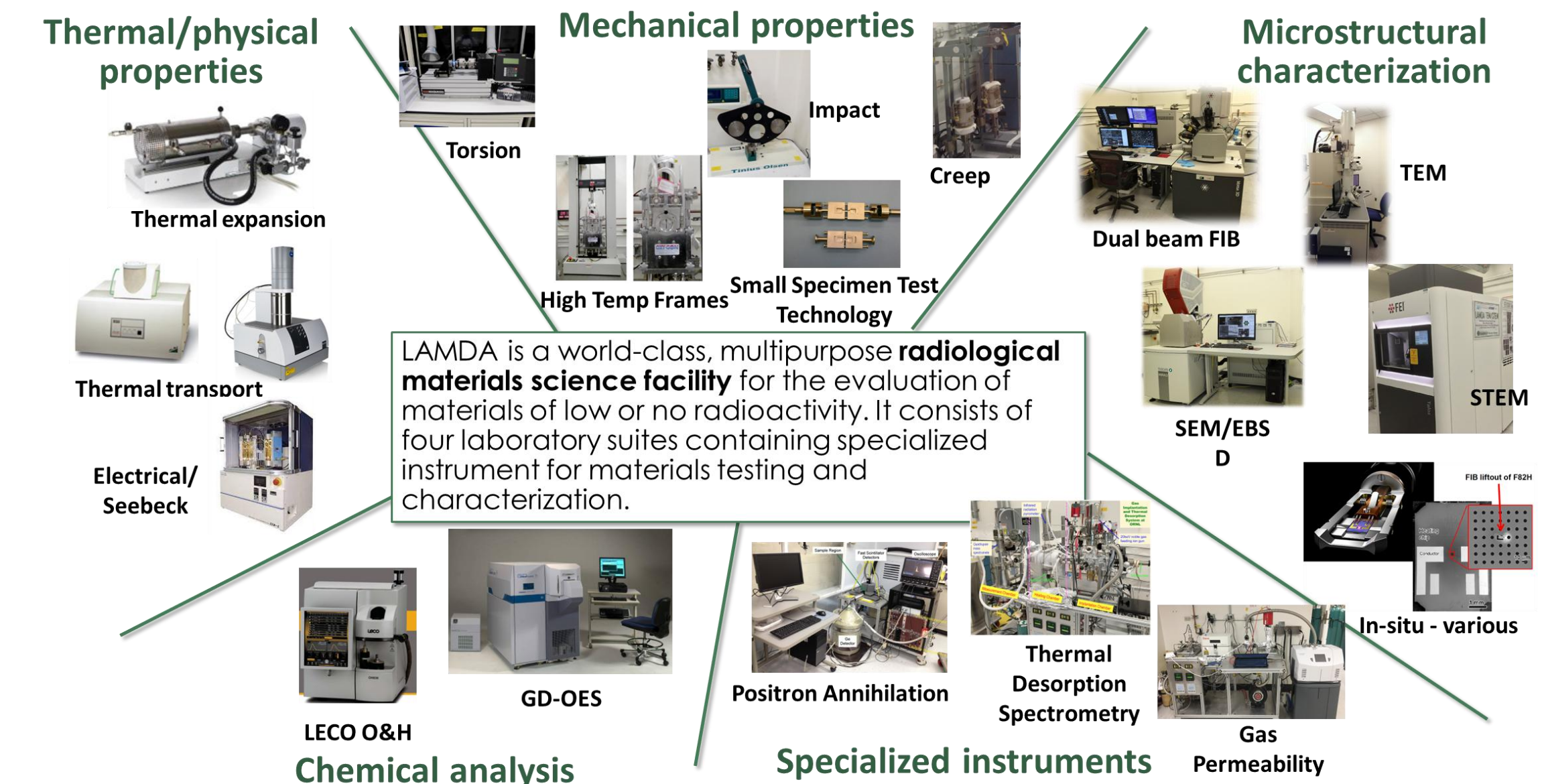


Flux Trap Experiments – Rabbits and Targets

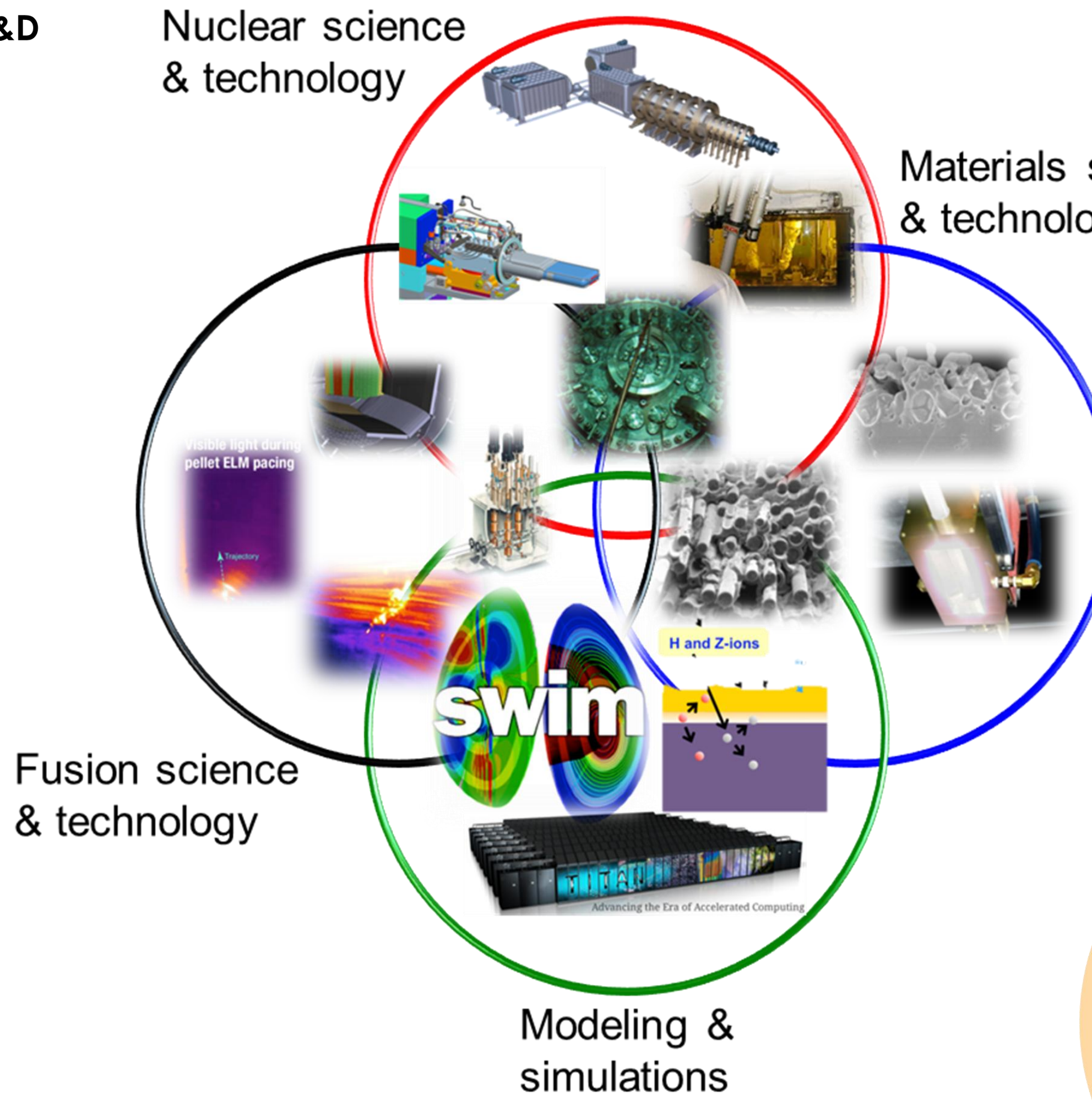
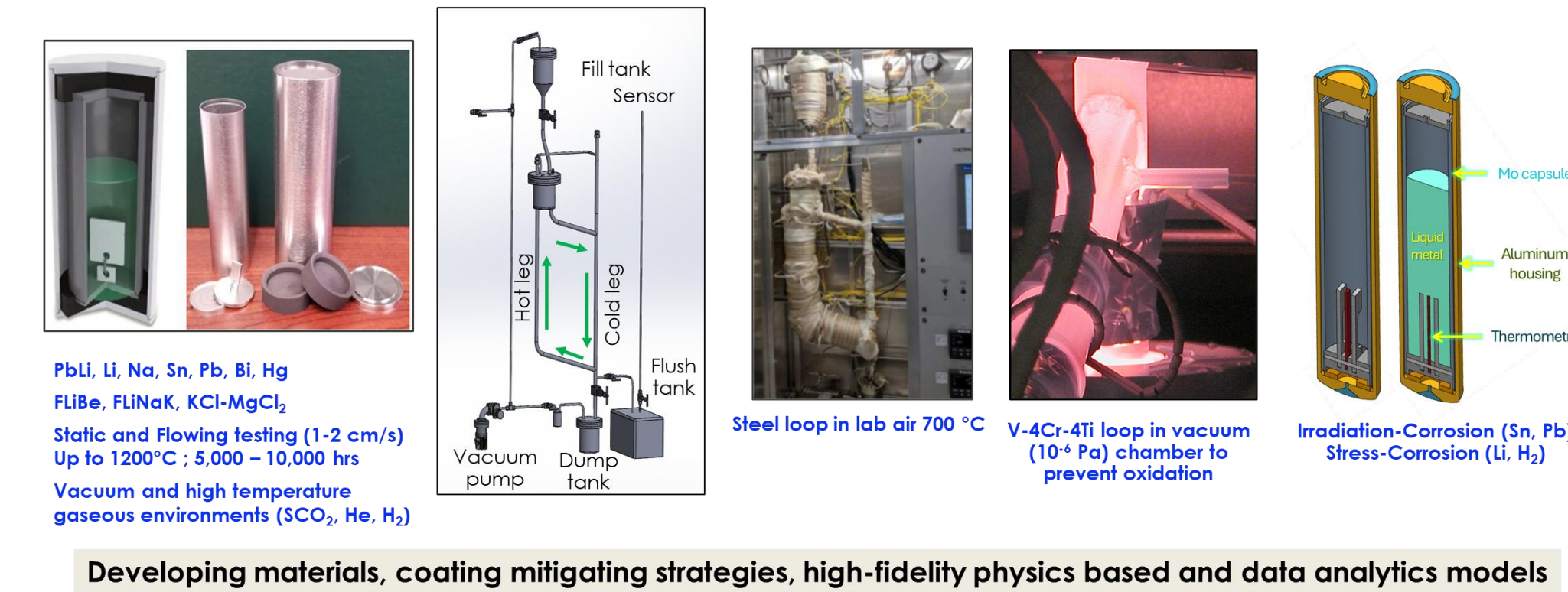
- **High fast flux:** 1.1×10^{15} n/cm²/s
- **High thermal flux:** 2.0×10^{15} n/cm²/s
- **Small diameter:** Ø9.5–11.3 mm
- **12.6 dpa/CY** (steel, assuming 7 cycles)
- ~150 available rabbit positions, none instrumented
- ~15 target positions, 2 instrumented
- Single temperature (60°C–1200°C)
- **Low cost:** \$30K–\$400K



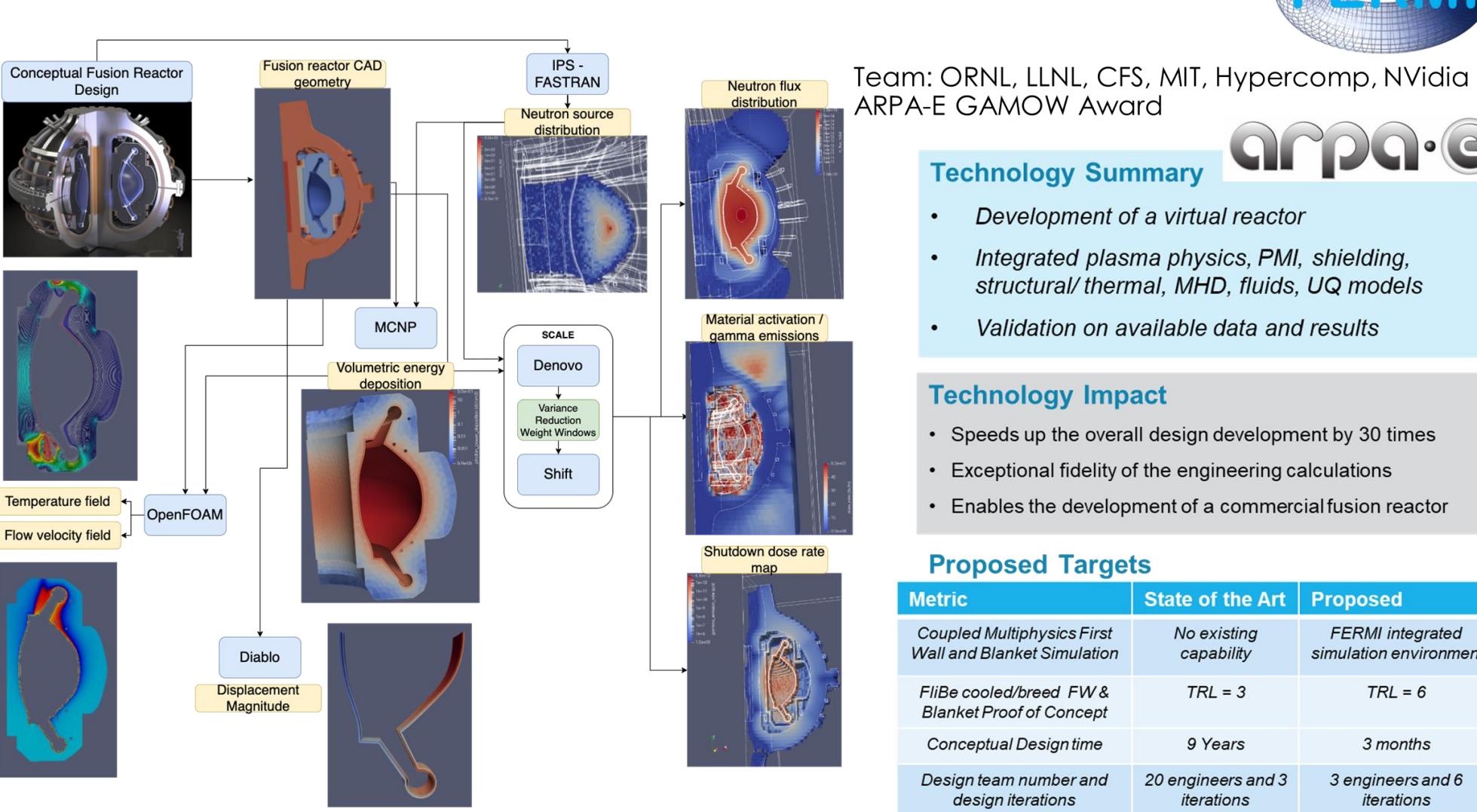
LAMDA – Low Activation Material Development and Analysis Laboratory



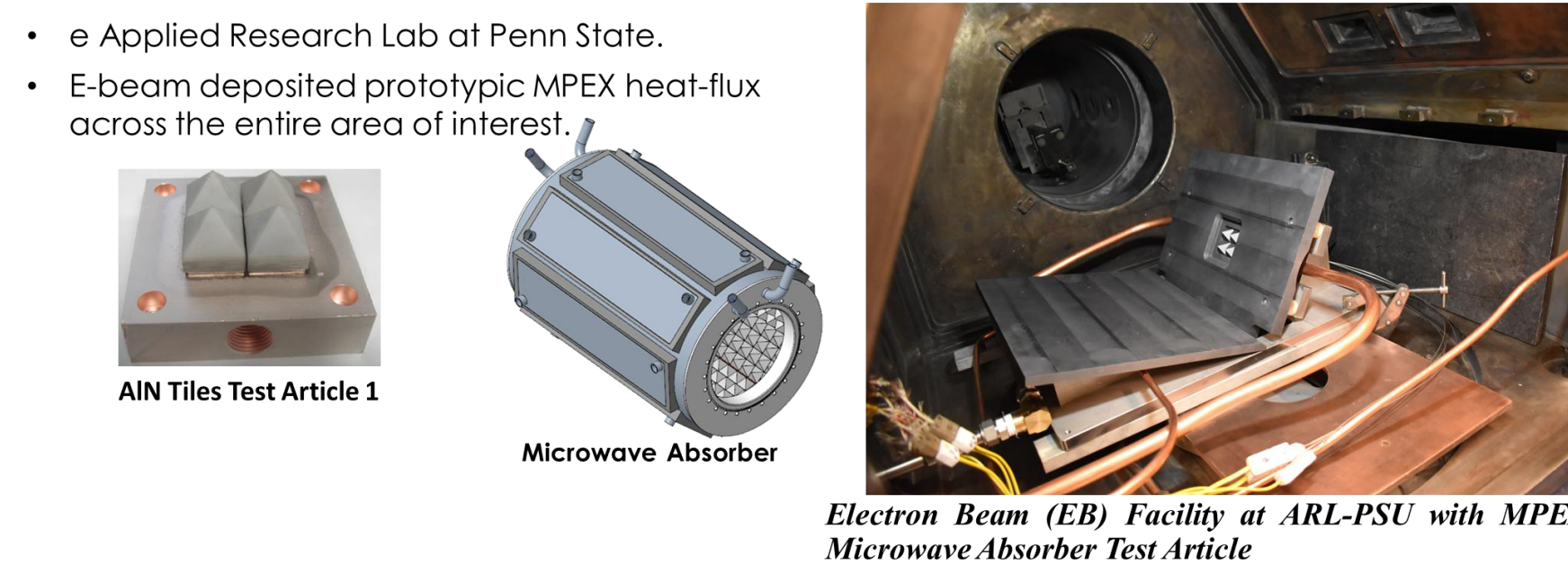
For over 70 years, ORNL's Corrosion group is tackling materials compatibility challenges in complex fusion environments



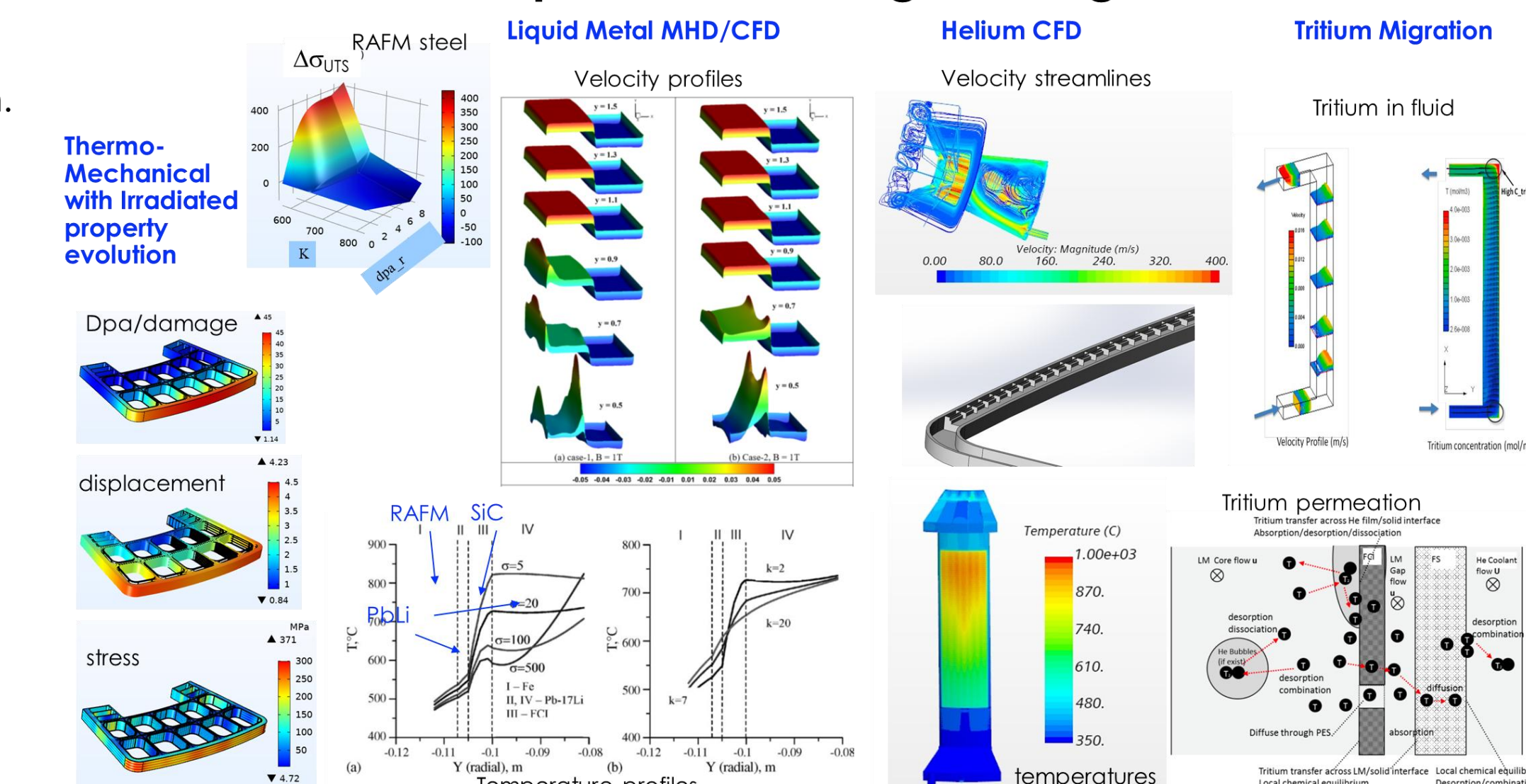
Fusion Energy Reactor Models Integrator (FERMI)



Steady-state PFC development and testing



ORNL FED Multi-Discipline Fusion Engineering Simulation



Fusion REactor Design and Assessment (FREDA)

- Rapid integrated assessment and iteration for detailed fusion reactor design.
- A compact steady-state FPP design point is being optimized in aspect ratio at "medium fidelity" to achieve high fusion power density and low recirculating power.

INFUSE Success

- Thirty previous INFUSE awards with ten different companies
- Topics span material science, diagnostic development, modeling and simulation, experimental capabilities, and enabling technologies

