



Sandia's LDRD Mission Campaigns

Mission-Focused Research and Development

The Laboratory Directed Research and Development (LDRD) program allows Sandia National Laboratories to pursue self-directed high-risk, high-reward science, technology and engineering (ST&E) innovation to address our nation's most difficult national security challenges. At Sandia, Mission Campaigns (MC) provide an agile, intentional process to bridge research and development ideas to mission application impact. Each MC combines strong leadership and coordination with a guiding five- to seven-year roadmap to develop forefront ST&E capabilities and overcome high-risk technical hurdles that address current and future national security needs. The MCs are multi-disciplinary, multi-million dollar portfolios of LDRD-funded projects that provide an opportunity for Sandia to partner with academia in a wider range of scientific fields. Through valued partnerships, Sandia can leverage cutting edge expertise and develop a strategic pipeline of ST&E talent to help tackle the next generation of national security challenges.



Assured Survivability & Agility with Pulsed Power

Rapid realization of next-generation pulsed-power capabilities for national security impact

The Assured Survivability and Agility with Pulsed Power (ASAP) Mission Campaign will rapidly develop next-generation pulsed-power capabilities to sustain and extend the nation's technological and intellectual leadership in hostile survivability of electronics and complex systems, nuclear weapon science, and broader national security issues. By investing in ST&E, this strategic initiative will not only maintain an effective nuclear deterrent, but also increase agility in the face of dynamic and evolving national security threats. In addition, investments in pulsed-power capabilities will enable much higher fidelity astrophysics experiments and create extreme temperatures and pressures for materials science studies. A focus for ASAP is to enable a next-generation pulsed-power (NGPP) system that delivers ten times the amount of energy possible today to create unprecedented levels of X-rays and neutrons in the laboratory. To realize this goal, the ASAP Mission Campaign is investing in novel solutions to a broad range of significant ST&E challenges to transform our pulsed-power capabilities.

Partner Opportunities

To help realize its goals, ASAP is currently seeking collaborative partnerships in the following research areas:

- Pulsed Power Switches: Multi-MV triggered and self-breaking switches with lower jitter, better reliability, and don't employ strong greenhouse gases such as SF₆.
- Advanced diagnostics for extreme environments: Radiation, electrical, and optical diagnostics that are spatially and temporally resolved
- Modeling and simulation: In the context of ultra-high current density electrical power delivery with melting conductors, we are interested in self-consistent multi-scale plasma physics modeling advances to bridge gaps between kinetic and fluid regimes. We are also particularly interested in validation of these physics models and other simulation approaches.
- Novel diagnostics, theory and integrated models for thermal desorption, melt, and plasma formation in conductors with terawatt scale heating.
- Advancement of our understanding in the engineering response of materials and electronics in harsh environments including neutrons, X-rays, kinetic debris, and electromagnetic fields
- Novel concepts, material advances, and engineering approaches for line replaceable units in pulsed power systems to increase shot rate, flexibility & agility
- Novel power flow designs and concepts for debris mitigation and increased target standoff in large scale fast pulsed power systems