Center for Impact Physics (CIP)

OVERVIEW

Lightweight protection technologies effective against an ever-increasing array of primitive and advanced technology threats will require a comprehensive, interconnected research effort that combines theoretical, computational, and experimental research in the fields of applied ballistics, high-rate mechanics and characterization of materials, and materials science. Similarly, this approach is also needed for advancing the state-of-the-art in lethality to be effective against future and emerging protection methods of ever evolving adversaries. The Center for Impact Physics (CIP) is a comprehensive consortium of organizations and facilities with the focused goal of creating future lethality and protection technologies specifically suited for blast and ballistic impact applications.

PARTICIPANTS

Open to national and defense labs, universities and industry. The CIP is currently partnered with the Department of Energy Laboratories at Argonne, Los Alamos, Sandia, and Lawrence Livermore, the University of Massachusetts at Amherst, the Institute for Shock Physics at Washington State University, and the University of Connecticut.

CONCEPT OF OPERATION

The CIP will establish an overarching Cooperative Research and Development Agreement (CRADA) that will define the extent of collaboration conducted under the center, the disposition of intellectual property and the sharing of research outcomes and laboratory resources.

Integrated Shock Physics and Dynamic Response of Materials Laboratory located at ARL

COLLABORATIVE FOCUS

- Nano-scale ballistic phenomena related to continuum level mechanisms
- High rate materials characterization, analysis, and computational sciences and multiple length scales
- Solid dynamics, materials science, and ballistics
- Synchrotron imaging of materials

BENEFITS

- Access to ARL's strong full spectrum capability (theoretical, computational and experimental expertise) in solid dynamics, materials science and ballistics
- Access to multi-scale studies of materials subjected to the full spectrum of loading rates encountered in terminal ballistics, material model development and predictive computational algorithms
- Unique capability to study the dynamic compressive response of individual grains of materials or small assemblies of grains for meso-scale model development and verification

UNIQUE FACILITIES

- ARL Supercomputing Resource Center including Cray XC40 supercomputer
- Quasi-static to ultra-high rate as well as high-fidelity terminal ballistic impacts
- Instrumented load cells, compression, tension, and torsion Kolsky bars, gas guns with laser interferometry instrumentation
- Dynamic fracture laboratory, ultrafast thermography, and ballistic impact chambers
- Dynamic Compression Sector at the Advanced Photon Source located on the Argonne National Laboratory

POINT OF CONTACT

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