We deliver precision data, advanced diagnostics, and high-fidelity models of shocked HE, metals, and polymers.

M-9 operates 10+ gas and powder guns at TA-40 and around the Laboratory, an indoor firing vessel, and supporting magazines and prep rooms.
Shock Physics
Team Leader: Brian Jensen (bjjensen@lanl.gov)

- We measure behavior of materials under dynamic loading conditions
  - Compression on and off-Hugoniot
  - Compaction of Granular Materials
  - Damage and Failure
  - Diagnostic Development
- Multiple impact systems (12-90 mm bore) achieve velocities up to 7-8 km/s.
  - DEOS (Dynamic Equation of State) Facility
  - 40 mm powder gun at pRad (proton radiography)
  - 40 mm gas/powder gun in glovebox at TA-55
Static High Pressure
Team Leader: Blake Sturtevant (bsturtev@lanl.gov)

- We use x-ray sources to investigate the behavior of materials exposed to high-presures and temperatures in a diamond anvil cell (DAC)
- Bridging static and dynamic strain rates
- Fundamental understanding of electronic and structural properties
  - Phase boundaries and structure
  - Generate isotherms – equation of state
  - Strength characteristics
  - Longitudinal and shear velocities
Shock Initiation and Chemistry
Team Leader: John Lang (jmlang@lanl.gov)

- We use embedded electromagnetic gauges to measure shock and reactive flow fields
  - Investigate initiation thresholds and mechanisms
  - Investigate phase transitions and decomposition in polymers
  - Interrogate shock-induced chemical reactions in organic materials
- Chamber 9 Gas Gun Facility
  - 50 mm two-stage gas gun (1.2-3.6 km/s)
  - 72 mm single-stage gas gun (0.05-1.0 km/s)
Detonation Physics
Team Leader: Terry Salyer (trsalyer@lanl.gov)

• We conduct fundamental detonation physics research
  – highly accurate measurements of detonation propagation and failure through complex geometries under various levels of confinement and temperature.

• We develop novel diagnostics
  – Examples: Spectrally Encoded Imaging (SEI) and Pulse Correlation Reflectometry (PCR)

• We operate Chamber 8:
  • LANL’s largest walk-in containment vessel with 10 kg load limit
  • Optimized for diagnostic-heavy tests.

• We operate at proton radiography (pRad) and other firing sites.
Effects of confinement

Detonation Modeling
Team Leader: Carlos Chiquete (chiquete@lanl.gov)

• We study detonation propagation in a range of conventional, insensitive, and non-ideal high explosives.
• Analysis tools range from asymptotic methods to state-of-the-art, high-resolution, multimaterial numerical simulation.
• We create reactive burn models calibrated to experimental data for use in production codes.
Crosscutting efforts: Diagnostic development and dynamic experiments at x-ray beamlines

European X-ray free electron laser (ExFEL)
Point of Contact (POC): Cindy Bolme

X-ray diffraction and phase Contrast imaging at the Dynamic Compression Sector (DCS)
DCS POC: Brian Jensen

High pressure experiments at
High Pressure Collaborative Access Team (HPCAT)
HPCAT POC: Blake Sturtevant