**Target:** Mars, the Moon, asteroids or other bodies in the solar system with rocky surfaces.

**Science:**
- Improve our understanding of the history of the inner solar system
- Enable improved triage for sample return missions

**Objectives:**
- Develop and test in-situ dating methods and test concordance using laser ablation resonance ionization mass spectrometry (LARIMS) measurements for the Sm-Nd, U-Pb or Th-Pb, and Re-Os geochronology systems.
- Assure compatibility of the LARIMS laser wavelengths with compact, robust fiber lasers, suitable for flight.
- Improve the reliability of a miniature backup laser system for the primary fiber laser system.

**CoIs:** Tom J. Whitaker/Southwest Research Institute; Jeff Pierce/Systems Optical, Inc.

**Key Milestones:**
- Year 1 - Achieve long-term stability of backup solid-state laser system (7/2018)
- Year 1 - Demonstrate U-Pb or Th-Pb LARIMS dating (7/2018)
- Year 2 - Demonstrate Sm-Nd LARIMS dating (8/2019)
- Year 3 - Demonstrate Re-Os LARIMS dating (8/2020)

**TRL 2 to 3**