# Ultra-bright scintillator for planetary gamma ray spectroscopy

PI: Thomas H. Prettyman/Planetary Science Institute

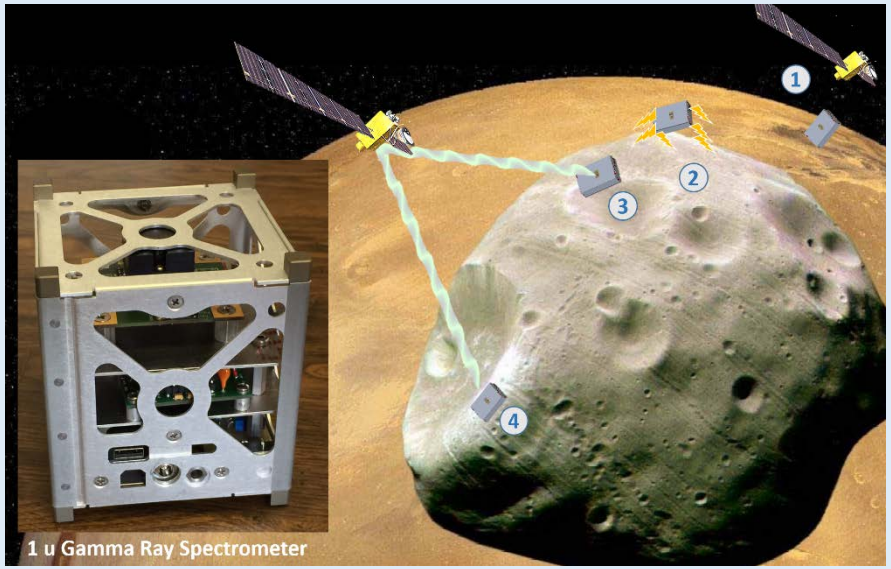
**Target:** Solid surfaces of solar-system bodies, small and large, planetary atmospheres, surface of Venus; deployable on most platforms (orbiters, rovers, landers, logging tools)

**Science:**

- Concentration of major rock-forming elements, selected trace elements, and volatiles (H, C); composition spatial maps and layering
- Geochemistry of targets, constraints on planetary formation (K/Th) and differentiation (aqueous & magmatic processes)
- Atmospheric dynamics and surface interactions

**Objectives:**

- Evaluate performance for prospective missions
- Grow 2-in. diameter $SrI_2$ crystals and engineer ruggedized sensor
- Test and evaluate $SrI_2$ crystals read out by silicon photomultiplier (SiPM)
- Determine radiation damage susceptibility and mitigation strategies




$SrI_2$ will enable compact gamma ray spectrometers with improved energy resolution and performance for elemental quantification.

**Key Milestones:**

- Year 1: Study performance for asteroid rendezvous missions; Evaluate radiation damage susceptibility
- Year 2: Study Venus in situ mission (including active interrogation); Manufacture large $SrI_2$ crystals
- Year 3: Study lunar sample return mission; Deliver a large-volume $SrI_2$/SiPM module; Complete testing and evaluation; publish results

**TRL 3 to 4**

**CoIs:** Arnold Burger/Fisk University; Naoyuki Yamashita/Planetary Science Institute; James L. Lambert, Jet Propulsion Laboratory