



Title Compact, Robust Spatial Heterodyne Raman Spectrometer for Planetary Exploration

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Target: The MSHRS is appropriate for use in landers and rovers on the Moon, asteroids, comets,

Mars, Venus and icy moons of Jupiter and Saturn.

Science:

- Raman spectroscopy is a powerful tool for planetary exploration but current instruments are large, heavy and fragile. The mSHRS is a new design that allows miniature solid-state Raman with higher resolution and sensitivity than current Raman instruments.
- The small, light weight mSHRS can be used for in-situ and remote Raman to support the search for current or extant life in the solar system.

Objectives:

- Bring spatial heterodyne Raman spectrometer, developed under previous PICASSO, to TRL3 using a monolithic integrated optical design.
- Develop a 12.5mm single-grating MSHRS small enough to measure Raman chemical maps directly in a borehole and to use in a 1U Planetary CubeSat size architecture.

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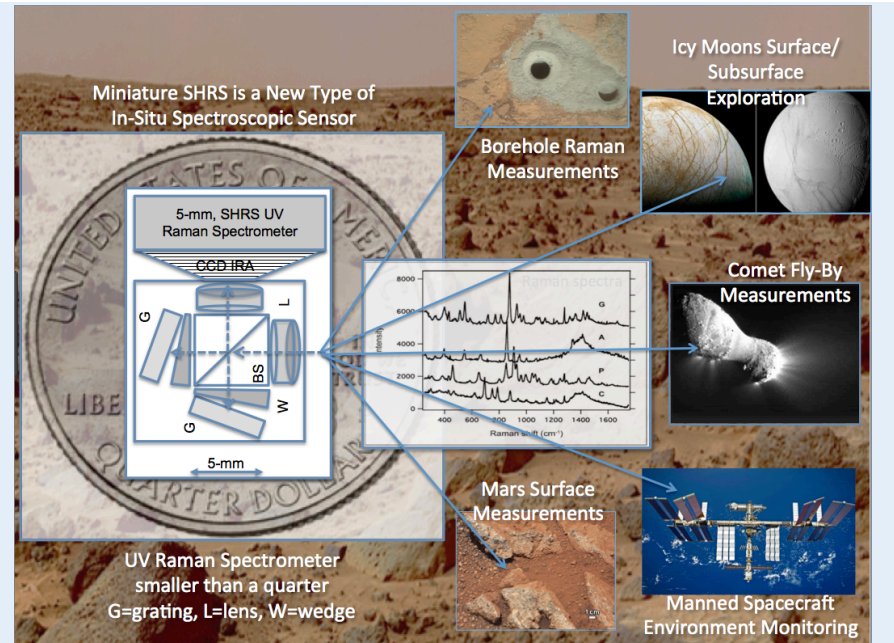


Figure Caption: (left) Scale drawing of a miniature spatial heterodyne Raman spectrometer made using monolithic optics (mSHRS) sitting on a US Quarter for scale. (middle) SHRS Raman spectra and (right) some applications of the new Raman technology.

Key Milestones:

- Year 1: Design, build and evaluate 25-mm 532nm mSHRS and compare stability to free-space optics design.
- Year 2: Design and build miniature 12.5mm, single-grating mSHRS and evaluate.
- Year 3: Demonstrate miniature mSHRS for direct borehole measurements and Remote Raman in CubeSat size architecture.

TRL (1-2) to (2-3)