Instrument Development Opportunities in NASA’s Planetary Science Division

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Program Executive
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Opportunities for Instrument Development and Advanced Components Technologies

- PICASSO
- MatISSE
- Mars Exploration Program
- Discovery Program
- New Frontiers Program
- Flagship Program

TRL 1  TRL2  TRL3  TRL4  TRL5  TRL6  TRL7

Mission Specific Flight Instrument Opportunities
Planetary Instrument Concepts for the Advancement of Solar System Observations (PICASSO)

• **What are the program goals?** The goal of the program is to conduct planetary and astrobiology science instrument feasibility studies, concept formation, proof of concept instruments, and advanced component technology development to the point where they may be proposed in response to the Maturation of Instruments for Solar System Exploration (MatISSE) Program. (TRL 1-3)

• **What are the program objectives?** The objectives of the program are to develop new technologies that significantly improve instrument measurement capabilities for planetary science missions (such as Discovery, New Frontiers, Mars Exploration, and other planetary programs).

• **Proposals sought?** Proposals are sought annually. PICASSO has an open NRA in ROSES-2015 (Appendix C.12) with proposals due by Oct 2015.

• **What the budget?** Budget is ~$3.5 M per year. The average award is ~ $275K per year per proposal.
Maturation of Instruments for Solar System Exploration (MatISSE)

**What are the program goals?** The goal of the program is to develop and demonstrate planetary and astrobiology science instruments to the point where they may be proposed in response to future announcements of flight opportunity without additional extensive technology development. (TRL 3-6).

**What are the program objectives?** The objectives of the program are to develop new technologies that significantly improve instrument measurement capabilities for planetary science missions (such as Discovery, New Frontiers, Mars Exploration, and other planetary programs).

**Proposal due date?** MatISSE proposals are sought bi-annually. MatISSE will have an open NRA in ROSES-2016 (Appendix C.16) with proposals due by April 2016.

**What the budget?** Budget is ~$6M per year. The average award is ~$1M per proposal per year for a performance period up to 3-years.
Estimated Number of Awards 2013-2018

Average Number of Awards

Fiscal Years

FY13  FY14  FY15  FY16  FY17  FY18

Number of Awards

PICASSO  MatISSE
Mission Specific Flight Instrument Opportunities

Europa Instruments Solicited in 2014

NASA issued an Announcement of Opportunity (AO) for science instruments that could be carried aboard a future mission to Jupiter’s moon Europa. Selected instruments will address fundamental questions about the icy moon and the search for life beyond Earth.
SuperCam builds upon the successful capabilities demonstrated aboard the Curiosity Rover ChemCam instrument during NASA's current Mars Mission. SuperCam will use three types of laser analysis to analyze rocks from a distance.

An important SuperCam addition that is not in ChemCam is the stand-off Raman spectrometry. This stand-off Raman spectrometry technology was developed through a competitive award under the PIDDP Program within NASA’s Planetary Science Division.

The principle investigator of SuperCam is Roger Wiens from Los-Alamos National Lab.
2014 Technology Infusion: PIXL

PIXL, an X-ray fluorescence spectrometer, will provide capabilities that permit more detailed detection and analysis of chemical elements than ever before.

PIXL’s new x-ray focusing optic technology was developed under the PIDDP program will allow vast improvements in the spatial resolution and acquisition time of these measurements, leading to more confident and detailed interpretations of rock chemistry - a major leap forward in scientific capability and value.

The principle investigator of the PIXL instrument is Abigail Allwood from the Jet Propulsion Laboratory.
SHERLOC, Scanning Habitable Environments with Raman & Luminescence for Organics and Chemicals, is the first UV spectrometer to fly to the surface of Mars, will determine fine-scale mineralogy and detect organic compounds.

The SHERLOC instrument has infused several technologies that were developed with support from the ASTID, ASTEP and SBIR Program.

The principle investigator of the SHERLOC instrument is Luther Beagle from the Jet Propulsion Laboratory.
Upcoming Flight Opportunities for Planetary Science Instruments

**Discovery Program**
- All mission targets except for Earth and Sun

**Small Innovative Missions for Planetary Exploration (SIMPLEx) Program** *(New) (ROSES-2014)*
- Explorer Mission -1 Opportunity (Earth Escape & Moon)
- Secondary Payloads

**New Frontiers 4 Program**
- Comet Surface Sample Return
- Lunar South Pole-Aitken Basin Sample Return
- Saturn Probe
- Trojan Tour and Rendezvous
- Venus In Situ Explorer
Important Dates and Contact Information

**Important Dates**

PICASSO_2014 Selection Announcements  May 2015
SIMPLEx_2014 Proposals Due  April 2015
PICASSO-2015 Proposals Due  October 2015
MatISSE_2016 Proposals Due  April 2016

**Contact Information**

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Development and Demonstration of a Venus Seismometer

PI: Gary Hunter/NASA Glenn Research Center

Science

- Enables seismometry on the Venusian surface that can explore the structure of the crust, lithosphere, mantel, and core.
- Enable the monitoring of tectonic and volcanic activity on Venus.
- High temperature electronics development enables other Venus surface instruments.

Objectives

To build from a previous proof-of-concept Venus seismometer which is

- Tailored for Venus environments and designed towards specific science objectives
- Demonstrated in laboratory and simulated Venus environments

Key Milestones

- Fabricate a 0.1-10 Hz seismometer that can operate at the Venusian surface temperature of 475 °C
- Fabricate a 0.01-10 Hz seismometer that can operate at 475 °C
- Verify that the 0.01 Hz seismometer is stable at 475 °C for 117 days (time between sunrises on Venus)


Planetary Instrument Concepts for the Advancement of Solar System Operations (PICASSO)