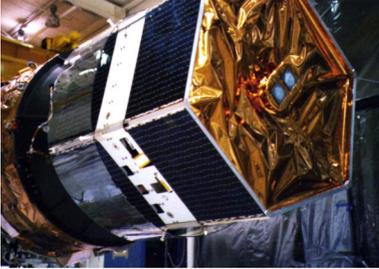
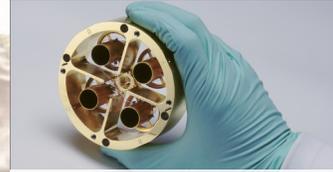


Engineering Capabilities

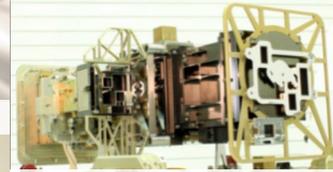
Systems Engineering



Test Facilities



Calibration and Test



Program Management



Flight Software



Quality Assurance



Mechanical & Thermal Engineering

Production



Electrical Engineering



LASP specializes in the design and development of flight instruments and spacecraft, with a focus on game-changing technologies.

Quick Facts

LASP has 30 instruments on 14 satellites:

GOES-16, MinXSS CubeSat, MMS, MAVEN, STPSat-3, Van Allen Probes, SDO, New Horizons, AIM, SORCE, Cassini, THEMIS, TIMED, Voyager

LASP is developing 13 instruments for 9 missions:

NASA: TSIS-1, SPP, CSIM, GOLD, Europa Clipper SUDA, MatISSE LAMA, CLARREO Pathfinder
NOAA—GOES-S, T, U, EXIS
UAE: Emirates Mars Mission EXI, EMUS

LASP has experience on NASA, NOAA, and Air Force contracts, as well as commercial partnerships.

LASP has launched 200 sub-orbital rocket experiments.

Full Lifecycle Program Management

- Science requirements definition to publication of data
- Hardware and software design, build, test, and delivery
- Financial and schedule management

Systems Engineering

- Requirements development and verification
- Interface control
- System analyses
- Resource tracking and management

Quality Assurance

- ISO 9001:2008 compliant
- Inspections for compliance to NASA and industry standards
- Safety, ESD, and contamination control

EEE Parts Engineering and Procurement

- Ensuring EEE part mission assurance requirements are met for design, quality, radiation and traceability

Electrical Engineering

- Low noise, high precision detector interface electronics
- Complex DSP and SoC FPGA design
- Custom low and high voltage power conversion
- Open-loop and precision closed-loop control

Flight Software

- Embedded systems to control flight instruments and spacecraft
- Ground systems such as S/C simulator software, telemetry analysis software, and FPGA diagnostics software
- Custom time slice architecture and VX Works RTOS
- NPR 7150.2 A compliant

Mechanical and Thermal Engineering

- Optical and electromagnetic fields instrument design, analysis, and test
- One-time and extended life mechanisms and gimballed platforms
- Thermal control design and testing of detector, payload, and spacecraft systems
- Spacecraft structures, kinematic mounts and vibration isolation, electronics packaging

In-House Production Operations

- Workmanship certified assembly and polymeric technicians
- CNC machining with CMM verification capabilities

Calibration and Test

- Optical design and detector development for X-ray to infrared wavelengths
- Full characterization capability with NIST-traceable calibration standards
- Vacuum and thermal environmental testing facilities

Current Projects and Recent Flight Hardware Deliveries

Instruments for multiple environments: ground based, suborbital, LEO, GEO, lunar orbiting, interplanetary

MMS ADP/SDP and DSP

- Four MMS spacecraft launched March 2015
- On-board, low power and configurable digital signal processing (DSP)
- A total of 48 LASP-provided space mechanisms
- Four 30-meter tip-to-tip electric field dipole antennas, each comprised of two 12.5-meter coilable structures and two 2.25-meter deployable antennas

MAVEN IUVS—Imaging UV Spectrograph

- Mars orbit insertion September 2014
- Image intensified 2D detectors
- High wavelength resolution
- Vibration damped kinematic mounts

TSIS SIM, TIM—Total and Spectral Solar Irradiance Sensor

In 2017, TSIS on the ISS will follow-on the SORCE collection of:

- Total solar irradiance (TSI)
- Solar spectral irradiance (SSI) data for the long-term climate record

TCTE—TSI Calibration Transfer Experiment

- Total Irradiance Monitor (TIM) hosted on the Air Force STPSat-3 launched in November 2013
- Rapid instrument development: contract start to spacecraft integration in only six months

GOES-R/S/T/U EXIS—EUV and X-ray Irradiance Sensors

- Uses silicon detection with custom six-channel ASIC and embedded processor (system-on-a-chip)

MinXSS—Miniature X-ray Solar Spectrometer

- NASA nanosatellite measuring the intensity of the solar soft x-ray spectrum from 0.4 keV to 30 keV since deploying from the International Space Station in May 2016

Van Allen Probes REPT and ECT—Relativistic Electric Proton Telescope

- Measures protons 20–100 MeV
- Measures electrons 2–25 MeV
- Customized radiation shielding and particle collimator

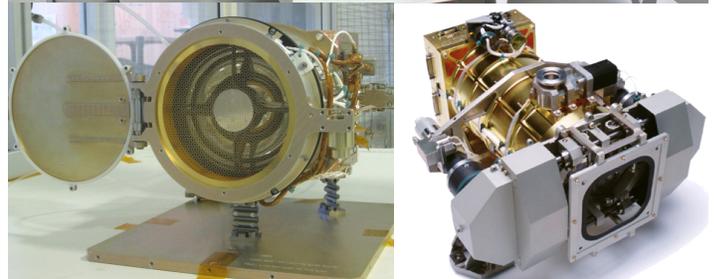
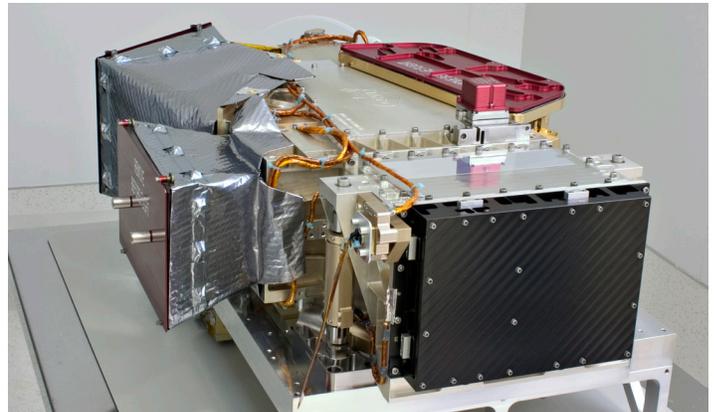
GOLD—Imaging UV Spectrograph

- NASA SMEX Mission of Opportunity, launch in early 2018
- Hosted payload on SES-GS communications satellite in geostationary orbit
- FUV spectrograph, 132–162 nm wavelength range
- Images atmosphere response to geomagnetic storms

HySICS—HyperSpectral Imager for Climate Science

- Demonstrates climate science radiometric accuracies in shortwave spectral region
- Single HgCdTe FPA covering 350–2300 nm at <0.2% radiometric accuracy and 6 nm spectral resolution
- Science flights in September 2013 and August 2014 on a high altitude balloon aboard the Wallops Arc Second Pointer and gondola

To learn more about LASP engineering capabilities, contact Tom Sparn at 303-492-2475 or tom.sparn@lasp.colorado.edu.



Top: MAVEN IUVS. Middle row: LADEE LDEX, TSIS/TCTE TIM. Bottom row: MinXSS, HySICS

The Laboratory for Atmospheric and Space Physics (LASP) combines all aspects of space exploration through our expertise in science, engineering, mission operations, and data management. As an institute at the University of Colorado Boulder, LASP includes students throughout our activities. Learn more at <http://lasp.colorado.edu>.