

PSEF 2022: Program Update for the Planetary Science Advisory Committee

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NASA HQ (Detailee from JSC)

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PSEF 2022 Program Overview:

- In total, 25 Step-2 PSEF proposals were received
- 10 proposals were selected for full or partial funding
 - Two proposals from one institution were combined into a single facility
 - One additional selection is contingent on matching funds from NSF
- Total costs of new selections for the 4-year cycle are expected to be ~\$22M
- The next PSEF Solicitation expected to be competed in ROSES 24
 - Step 1 proposals due ~April 2024
 - Step 2 proposals due ~June 2024
- 1 legacy facility will be continued until PSEF round 2

PSEF 22 FACILITIES START

PSEF 24 FACILITIES START

PSEF 26 FACILITIES START



10/1/2022

1/1/2023

4/1/2023

7/1/2023

10/1/2023

1/1/2024

4/1/2024

7/1/2024

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10/1/2025

1/1/2026

4/1/2026

7/1/2026

10/1/2026

1/1/2027

4/1/2027

PSEF 24 DUE

PSEF 22 MID-TERM REVIEWS

PSEF 26 DUE

PSEF 24 MID-TERM REVIEWS

10/1/2022

7/1/2024

10/1/2024

7/1/2026

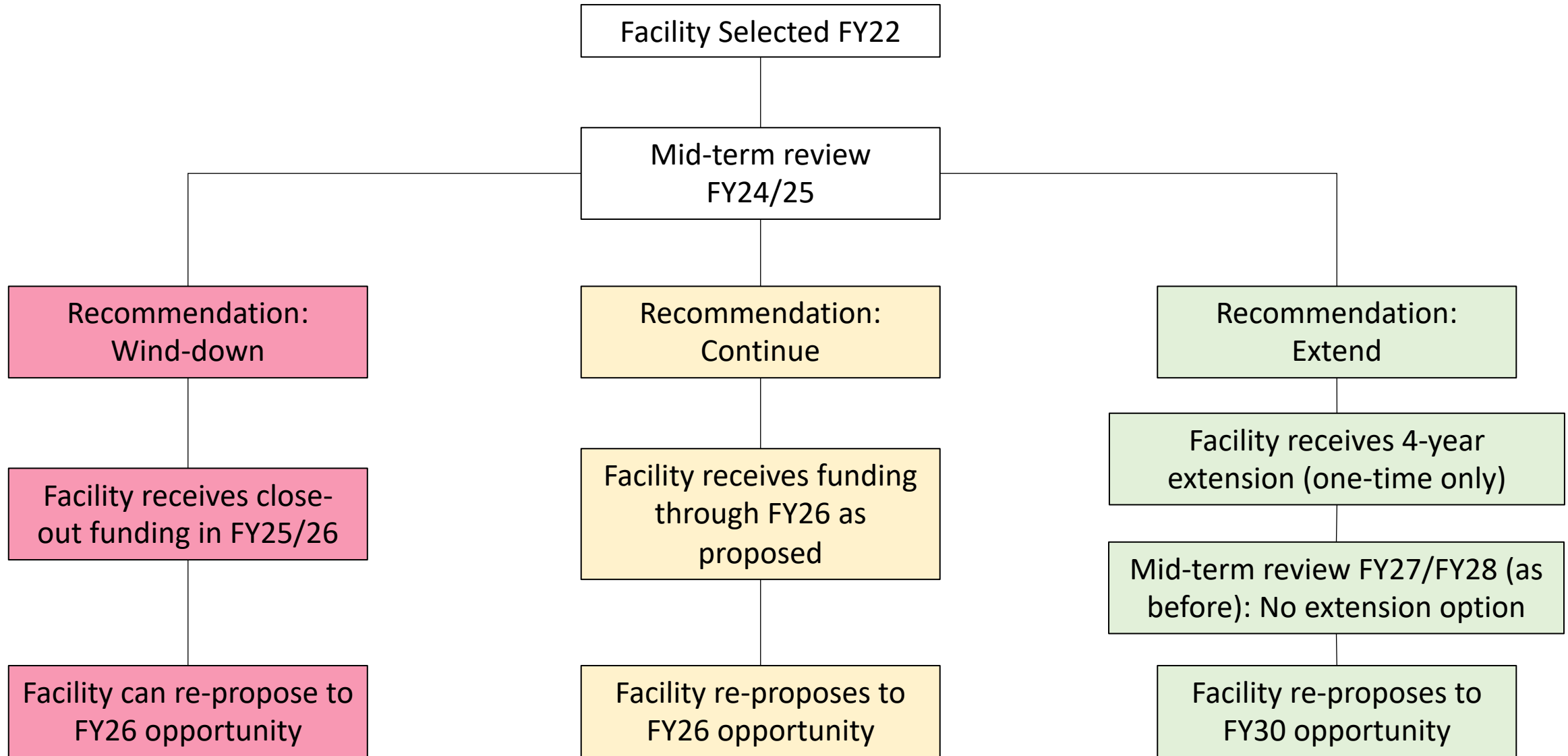
10/1/2026

4/1/2027

4/1/2025

4/1/2027

Facility mid-term reviews outcomes



Where to go for facility information

- Each Facility has been asked to supply a quad chart with key details on facility capabilities, how it can be accessed, and who to contact for further information
- Information for all facilities will be contained on the NASA Science Webpage, link will also be given in appendix C.1
 - <https://science.nasa.gov/researchers/planetary-science-enabling-facilities>

PSD's Planetary Science Enabling Facilities:

- Support of the GSECARS Synchrotron Facility for Planetary Science Research, PI Lanzirotti
- Development of the Lunar and Planetary Institute Scanning Electron Microscope Facility, PI Goodrich
- The Kuiper Materials Imaging and Characterization Facility at the University of Arizona, PI Zega
- The Reflectance Experiment LABORatory (RELAB): Enabling Spectroscopy of Planetary Materials and Surfaces in the Coming Decades, PI Milliken
- Planetary Cloud Aerosol Research Facility, PI Pauken

PSD's Planetary Science Enabling Facilities:

- Facility for Astromaterials Research at NASA, PI Filiberto
- UTCT: High Resolution X-ray CT Facility Enabling Planetary Science Research, PI Hanna
- KEVION: A KiloElectron-Volt Ion Irradiation Facility for Space Science
- Planetary Aeolian Laboratory at NASA Ames Research Center, PI Cummings
- NASA Ames Vertical Gun Range, PI Raiche
 - Legacy facility, will compete in PSEF 2022



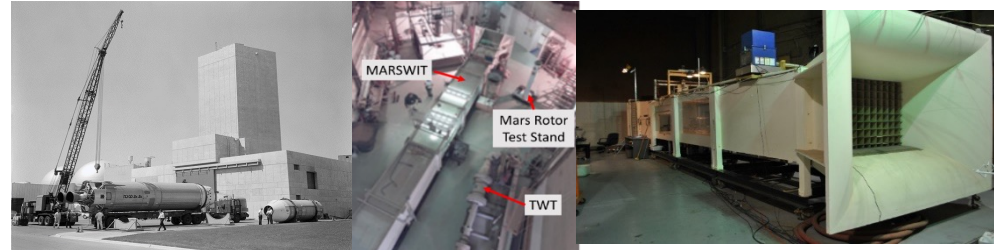
Planetary Aeolian Laboratory

PI: Haley Cummings, NASA Ames Research Center

Website: <https://www.nasa.gov/ames/planetary-aeolian-laboratory>

Description of Facility

- The Planetary Aeolian Laboratory (PAL) is used to conduct experiments and simulations of aeolian processes under planetary atmospheric environments in the 4000 m³ chamber
- Available instruments and apparatus include the Mars Surface Wind Tunnel (MARSWIT), the Titan Wind Tunnel (TWT), one differential and two absolute pressure transducers, Vaisala dewpoint and temperature transmitter, 24 type T thermocouples, Keithley 602 Solid State Electrometer, and LabView data acquisition system
- Access available to the facility and instruments will be in person; No restrictions to access



The PAL (left), the facilities inside the PAL (center), and the MARSWIT (right)

How to use the facility

- Projects funded through Solar Systems Workings (SSW) request access via proposal
- Projects funded elsewhere request access via email to PAL Principal Investigator (see Contact Information section)
- Requests are evaluated and prioritized based on Planetary Science Division (PSD) priorities and facility schedule; first priority goes to PSD Research and Analysis (R&A), second priority goes to work relevant to PSD R&A, third priority goes to other users
- Cost to use facility: \$1500/day at low-pressure conditions

Contact information:

- Facility is located at NASA Ames Research Center, Moffett Field, CA 94035 in Building N242
- Through September 2023, contact David Williams (david.williams@asu.edu) with questions or for schedule information
- Starting October 1, 2023, contact Haley Cummings (haley.cummings@nasa.gov)



PAL Website

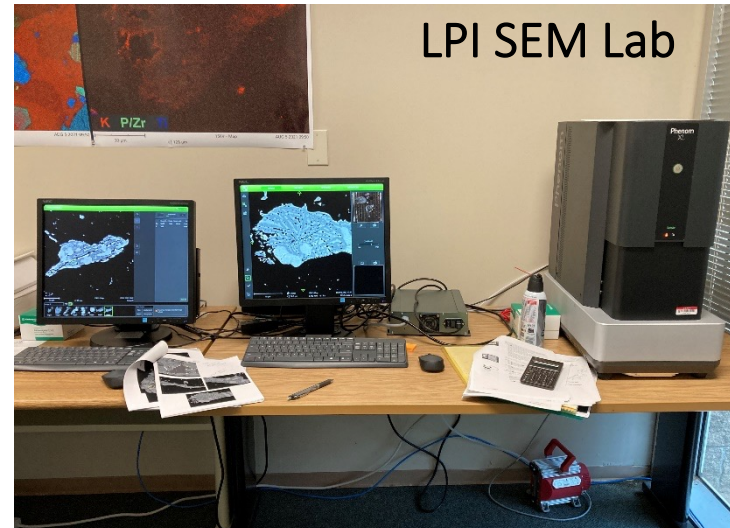


The Lunar and Planetary Institute Scanning Electron Microscope Facility

PI: **Dr. Cyrena Goodrich, LPI/USRA** Website: [LPI Science Labs and Equipment \(usra.edu\)](http://LPI Science Labs and Equipment (usra.edu))

Description of Facility

- Scanning electron microscope laboratory
- Phenom XL Desktop SEM
- Currently >50% of the time is available for outside users
- In person use (no remote access); training required; thereafter unsupervised access is allowed.
- No restrictions other than required training and demonstration of competence to use the instrument.



How to use the facility

- Send email to Manager Goodrich and Co-Manager Crossley to request time.
- Requests are evaluated based on training and need.
- LPI and ARES/JSC personnel are given priority, but currently demand is low.
- There is currently no charge for use of the LPI SEM.

Contact information:

- Lunar & Planetary Institute, 3600 Bay Area Blvd, Houston, TX 77058 USA
- Dr. Cyrena Goodrich (goodrich@lpi.usra.edu) or Dr. Samuel Crossley (scrossley@lpi.usra.edu)



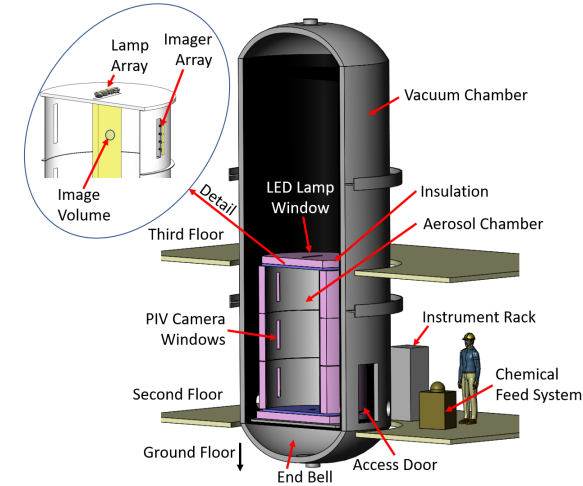
Planetary Cloud/Aerosol Research Facility

PI: Mike Pauken / Jet Propulsion Laboratory - Caltech

Website: n/a

Description of Facility

- Overview of facility: Investigate formation, lifetime, and optical properties of planetary clouds and aerosols via condensation and evaporation processes in a temperature and pressure controlled atmospheric gas environment.
- List of available instruments or apparatus:
 - Scanning Mobility Particle Sizer Spectrometer
 - Aerodynamic Particle Sizer
 - Particle Tracking Velocimeter
 - Phase Doppler Particle Analyzer
 - Gas Chromatography/Mass Spectrometry
- Fraction of instrument time available to the community: 80%
- Type of access available: in person
- Restrictions on access: none, JPL visitor onboarding



Conceptual Configuration of the Planetary Cloud/Aerosol Research Facility

How to use the facility

- How to request access: Contact POC or other JPL science team member, will need funding from PSD ROSES program award.
- How requests are evaluated. Science team reviews PI proposals, provides proposing PI relevant guidance on facility capabilities.
- How requests are prioritized. First come, first serve, coordinated schedule with JPL facilities
- Operating cost: Chamber operations cost \$8 to \$20K/day depending on thermal loads plus experiment set up at \$2K/day.

Contact information:

- Jet Propulsion Laboratory/California Institute of Technology
- POC for information and scheduling: Mike Pauken
- mpauken@jpl.nasa.gov
- (818) 237-0645 - cell



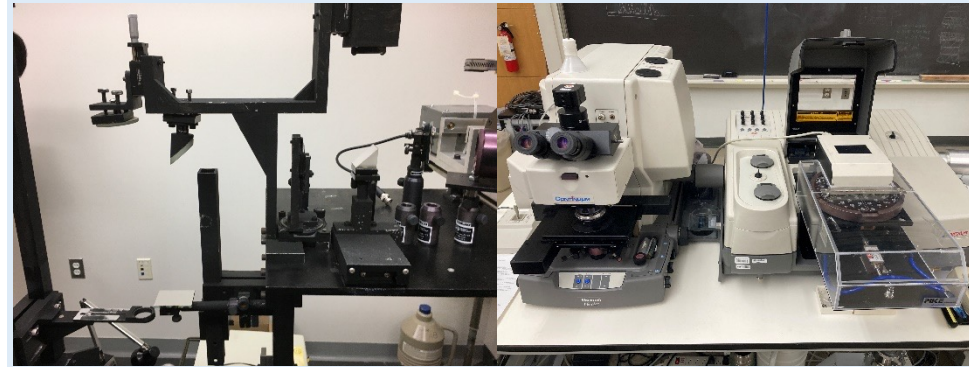
Reflectance Experiment LABORatory (RELAB)

PI: Ralph Milliken/Brown University

<https://sites.brown.edu/relab/>

Description of Facility

- Spectral reflectance and transmission data of Earth and planetary materials at visible-near-mid-far infrared wavelengths
- Custom bi-directional spectrometer (BDR) for reflectance or transmission measurements; viewing geometry can be changed for photometric studies; FTIR and microscope FTIR for reflectance and transmission measurements
- 100% available for community use
- Analyses done by facility personnel or by visitors
- No restrictions for short term use; long term or independent use requires completing university lab safety training



Left: Close-up image of portion of the custom bi-directional spectrometer showing exiting path for light reflecting off of sample surface.

Right: Existing microscope FTIR and benchtop FTIR for acquiring near-mid-far IR spectra; these instruments will be upgraded in 2023 as part of PSEF funding.

How to use the facility

- E-mail [Ralph Milliken@brown.edu](mailto:Ralph_Milliken@brown.edu) and [Takahiro Hiroi@brown.edu](mailto:Takahiro_Hiroi@brown.edu)
- All requests for feasible measurements are accepted
- Requests are prioritized based on first-come first-serve basis; large number of measurements for single user may be interspersed with other user measurements; NASA-funded researchers given priority
- No charge to users other than costs for shipping materials to and from the facility

Contact information:

Department of Earth, Environmental & Planetary Sciences
Brown University
Campus Box 1846 (FedEx samples to: 324 Brook St.)
Providence, RI 02912

For measurement requests and lab use, contact:

Dr. Takahiro Hiroi Takahiro_Hiroi@brown.edu 401-863-3776



KEVION: A KiloElectron-Volt Irradiation Facility for Space Science

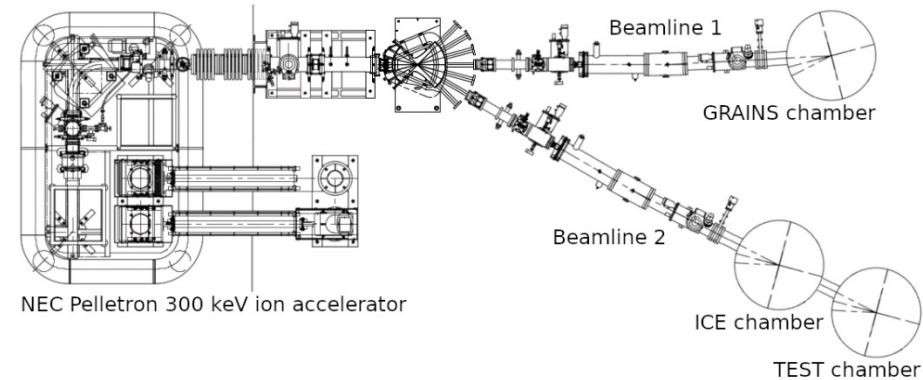
PI: Catherine Dukes / University of Virginia

Website:

<https://engineering.virginia.edu/laboratory-astrophysics-and-surface-physics-lasp-uva>

Description of Facility

- 25-300 keV Ion Implantation Instrument with dual multi-technique analytical chambers (GRAINS/ICE) and minimally-instrumented TEST chamber
- GRAINS chamber with XPS / RBS / UV-Vis-NIR Hyperspectral Imaging / Ion-Neutral Mass Spec.
- ICE chamber with QCM / FTIR / Kelvin Probe / UV-Vis Interferometer / Ion-Neutral Mass Spec.
- NASA DPS Instrument Availability: ~6 months/yr.
- Access is available for “in person” measurements or irradiation/analysis done by facility personnel.
- Requirements: Completion of Safety Protocols and Instrument Training prior to “in person” access



A schematic representation of the KEVION irradiation facility shows the Pelletron ion accelerator with dual beamlines and multi-technique analytical chambers (GRAINS & ICE). The TEST chamber provides a platform for instrument prototyping and calibration.

How to use the facility

- Submit “Request for Service” Information form on KEVION Website (under construction):
<https://engineering.virginia.edu/lasp-KEVION-ion-irradiation-facility>
- Requests are evaluated by PI Dukes & Instrument Scientist (TBD) with input from Co-Is/Collaborators
- Requests are prioritized by (1) Request Date; (2) Need Date; (3) Experimental Readiness
- No cost for NASA DPS awarded projects; tiered-cost system for other projects, nominally: NASA non-DPS & UVa [\$45/hr]; external academic / government [\$55/hr]; & industrial clients [\$150/hr].

Contact information:

- **Location:** University of Virginia, Laboratory for Astrophysics and Surface Physics, Department of Materials Science and Engineering, Thornton Hall B112, Charlottesville, VA 22904
- **POC:** Catherine Dukes / Instrument Scientist (TBD)
- email: cdukes@virginia.edu, phone: 434.924.1059



Facility for Astromaterials Research at NASA

PI: Justin Filiberto/NASA JSC

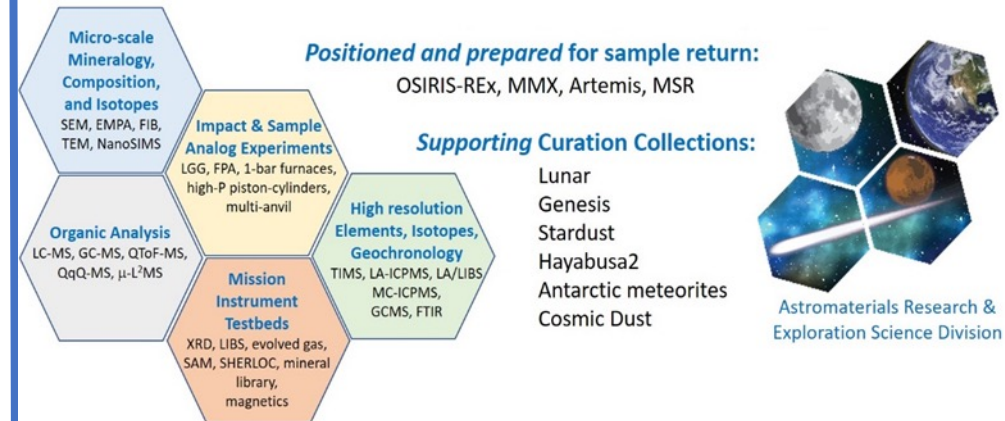
<https://ares.jsc.nasa.gov/research/laboratories/>

Description of Facility

- Overview of facility- ARES houses a unique combination of laboratories, instruments, and infrastructure for conducting broad-based world-class planetary research.
- List of available instruments or apparatus – see website above for all 20+ laboratories and details about each instrument
- Fraction of instrument time available to the community – 10-20% depending on the laboratory
- Type of access available - in person, or analyses done by facility personnel
- Restrictions on access – All visitors must be PIV badged for IT access

How to use the facility

- How to request access – short proposals that are solicited three times a year
- How requests are evaluated – short proposals reviewed by ARES scientists for feasibility and a proposal review panel for merit
- How requests are prioritized – NASA funded research in active PSD R&A proposals are prioritized. Additional consideration is given to access requests from early career/next-generation scientists, under-represented minorities, and those PIs from minority serving institutions.
- What does it cost to use the facility – there is no cost to use the facility



Contact information:

- Houston, Texas
- Justin Filiberto
- Justin.R.Filiberto@nasa.gov
- 281-483-8924



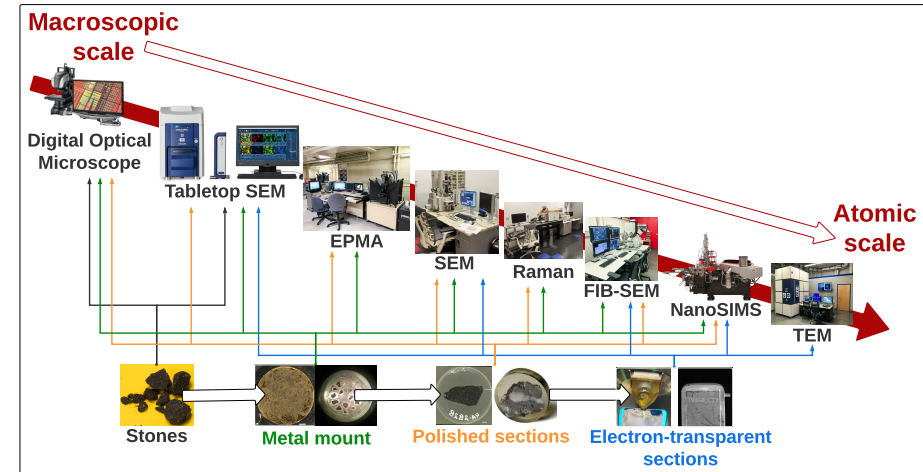
Kuiper Materials Imaging and Characterization Facility

PI: Thomas Zega/University of Arizona

<https://kmicf.lpl.arizona.edu>

Description of Facility

- The KMICF was founded in 2016, motivated by the need for accessible world-class instrumentation in support of planetary materials analysis including returned samples from missions like OSIRIS-REx
- Techniques include scanning electron microscopy, electron microprobe analysis, focused-ion beam scanning-electron microscopy, Raman spectroscopy, nanoscale secondary ion mass spectrometry, and transmission electron microscopy
- 60% of Facility time available to PSD researchers
- Analyses can be in person or by facility personnel
- Users must contact lab managers for access



The technical capabilities of KMICF. Planetary materials can be measured at spatial scales ranging from hand sample down to the atomic and in multiple geometries including particles, grain mounts, polished thin or thick sections, and electron-transparent ultramicrotome or FIB sections.

How to use the facility

- To request access, visit <https://kmicf.lpl.arizona.edu/contact>
- Requests are evaluated based on a short proposal either via email or an attachment to email (two pages maximum) after a conversation with one of our laboratory managers
- Requests will be prioritized on a first come, first serve basis
- The costs to use the KMICF are here: <https://kmicf.lpl.arizona.edu/user-information/rates>

Contact information:

- Lunar and Planetary Laboratory, University of Arizona, 1629 E. University Blvd. Tucson, AZ 85721
- POCs: <https://kmicf.lpl.arizona.edu/contact>



UA SCIENCE

**KUIPER IMAGING
FACILITY**



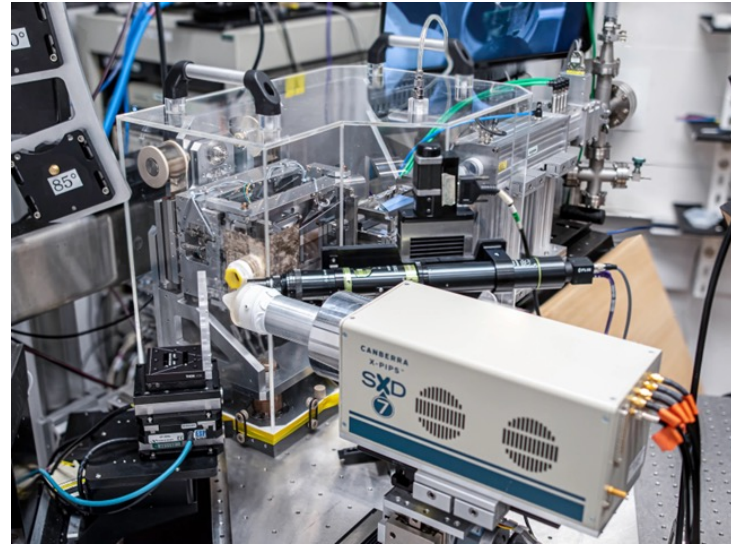
GSECARS Synchrotron Facility for Planetary Science Research

PI: Antonio Lanzirotti/The University of Chicago

<https://gsecars.uchicago.edu>

Description of Facility

- GSECARS Sector 13 beamlines at the Advanced Photon Source for synchrotron-based microanalysis in planetary science research.
- Access to X-ray microprobe for X-ray fluorescence, X-ray absorption fine structure spectroscopy, X-ray diffraction, full-field computed microtomography, and support for focused ion beam section preparation at the University of New Mexico.
- Support for both in-person and remote analyses



GSECARS
X-ray
Microprobe at
beamline
13-ID-E

How to use the facility

- Beamtime requests are made through the peer-reviewed Advanced Photon Source General User system (<https://aps.anl.gov/Users-Information/About-Proposals/Apply-for-Time>).
- Approximately 80% of available total time at these beamlines are allocated to Earth and Planetary Science proposals.
- No experiment fees for non-proprietary experiments.
- Contact the GSECARS Synchrotron Facility for Planetary Science Research PI for assistance in preparing and submitting proposal requests.

Contact information:

- Sector 13 at the Advanced Photon Source, Argonne National Laboratory, Lemont Illinois, USA.
- Sector information and proposal submission guidelines can be found at <https://gsecars.uchicago.edu>
- For PSEF beamline support contact Dr. Antonio Lanzirotti (The University of Chicago) lanzirotti@uchicago.edu.



University of Texas High-Resolution X-ray CT Facility (UTCT)

PI: Romy Hanna / University of Texas at Austin

www.ctlab.geo.utexas.edu

Description of Facility

- Two high-resolution X-ray computed tomography (XCT) scanners to image mm- to dm-sized samples and an image analysis laboratory
- Data resolution down to $< 1 \mu\text{m}/\text{voxel}$
- Specialized XCT capabilities include oversampling for better resolution on large samples and zoom/subvolume imaging for small ones
- Diffraction Contrast Tomography (DCT) for 3D crystallographic orientations in samples up to $\sim 2 \text{ mm}$
- Visitors welcomed to observe scanning, utilize image analysis laboratory for data exploration, visualization, and quantification, and participate in short courses in XCT data acquisition, visualization, and analysis



UTCT XCT Scanners. (left) NSI scanner: 450- and 225-kV X-ray sources and a flat-panel detector for larger and/or relatively more attenuating samples. (right) Zeiss Versa 620 scanner: 160-kV X-ray source and six detectors for smaller and/or relatively less attenuating samples and DCT.

How to use the facility

- Contact UTCT to discuss sample, imaging/measurement goals, and feasibility
- Sample can be shipped or hand-carried
- Usually a 2-week turnaround from sample reception to data delivery
- 50% discount for NASA PSD-funded projects, resulting in a typical cost of $\sim \$200$ – $\$500/\text{sample}$ depending on sample composition, desired resolution, and data quality requirements; an estimate can be provided prior to data acquisition.
- A free test scan can be provided as proof-of-concept for grant proposals

Contact information:

- UTCT is located in the Jackson School of Geosciences at the University of Texas at Austin (JGB 1.120; <https://www.google.com/maps/dir//30.2858516,-97.7356688>)
- For inquiries contact Dr. Romy Hanna at romy@jsg.utexas.edu or 512-471-0260