

A New Laboratory Facility in the Era of Sample Return: the Sample Analysis Laboratory (SAL) at DLR Berlin

Enrica Bonato enrica.bonato@dlr.de

Sabrina Schwinger, Alessandro Maturilli

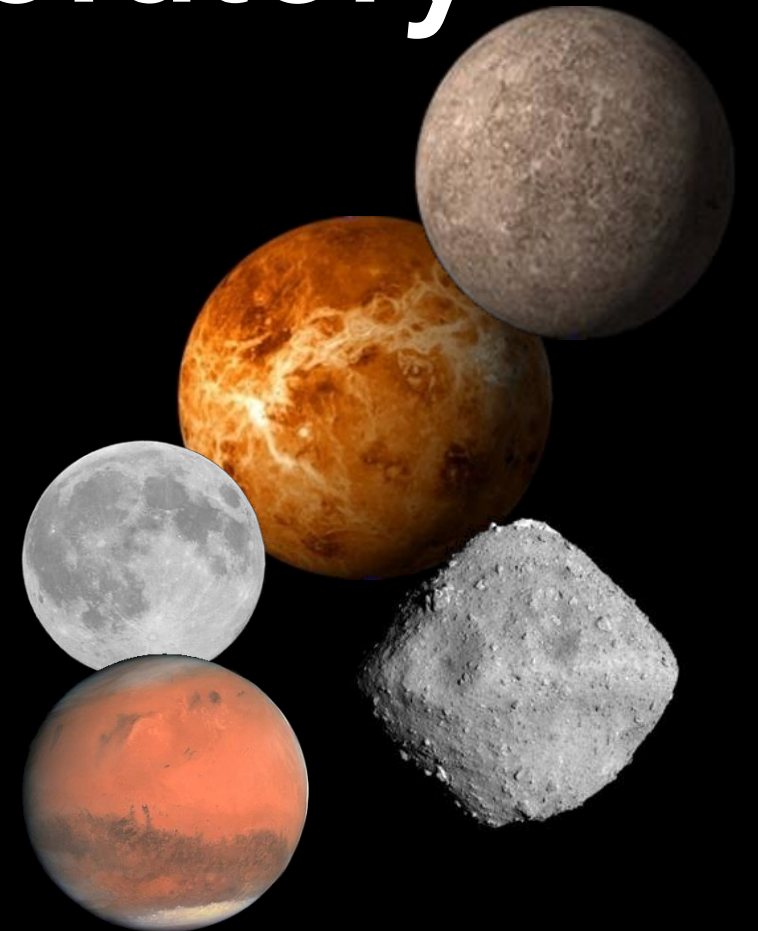
Jörn Helbert

DLR, Institute for Planetary Research,
Berlin, Germany



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Deutsches Zentrum
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Introduction

The Institute for Planetary Research at DLR is expanding its existing laboratory infrastructure with the creation of the Sample Analysis Laboratory (SAL).

The step-wise extension follows the successful development approach used for the Planetary Spectroscopy Laboratory (PSL) and Astrobiology Laboratories.

The laboratory will be operated as a community facility, with the aim to offer to the German and European planetary science community a newly dedicated state-of-the-art laboratory, with the possibility of being extended to a full Sample Curation facility.

It will develop over the next 3 years and it will focus its capabilities on mineralogical and geochemical characterisation of extra-terrestrial materials returned from sample return missions from asteroids, Moon and Mars.



Foto: Irimi Vlachadi

The Planetary Spectroscopy Laboratory at DLR

- **PSL** is a world leading spectroscopic infrastructure with the capability to measure emissivity of powder materials, in air or in vacuum, from low to very high temperatures, over an extended spectral range.
- Emissivity measurements are complimented by reflectance and transmittance measurements produced simultaneously with the same setup.
- The laboratory has a strong involvement in space missions such as: ESA BepiColombo (MERTIS), Hayabusa2 (JAXA), MarsExpress, VenusExpress, MESSENGER, Rosetta (ESA).
- It has experience in analysing a very diverse range of samples such as: terrestrial rocks, minerals, meteorites and lunar regolith from the Apollo missions.

Equipment

- **3 FTIR spectrometers** for air and vacuum measurements in emittance, transmittance and reflectance modes with wavelength range from 0.3 to beyond 100 micron.
- A **vis-IR-microscope** for sub-micron scale analysis in preparation of the SAL setup.

PSL is a community facility as part of the "Distribute Planetary Simulation Facility" in European Union funded **EuroPlanet** Research Infrastructure.

Raman Laboratory

- Raman micro-spectrometer fitted with cryostat serving as planet simulation chamber especially for icy moons.
- Possibility to analyse biological (e.g. BIOMEX) and inorganic materials.

SAL is an extension of the current laboratory facilities within the Planetary Laboratory Department.

- It will be focusing its attention on *in situ* mineralogical and geochemical analysis mainly of extra-terrestrial material returned from sample return missions, as well as of meteorites and sample analogue materials.
- Housed within ISO5 clean rooms, it will be equipped with glove boxes for handling and preparation of the samples.
- All samples will be stored under dry nitrogen and can be transported between the instruments in dry nitrogen filled containers

Equipment

- Field Emission Gun Electron Microprobe Analyser (FEG-EMPA)
- Field Emission Gun Scanning Electron Microscope (FEG-SEM) equipped with:
 - EDX detector for chemical mapping
 - STEM detector
- X-ray Diffraction (XRD):
 - Measurements of powders
 - μ -XRD for *in situ* analysis and mapping
 - Non-ambient stage for dynamic experiments
- Polarized light microscope
- Supporting equipment for sample preparation and handling

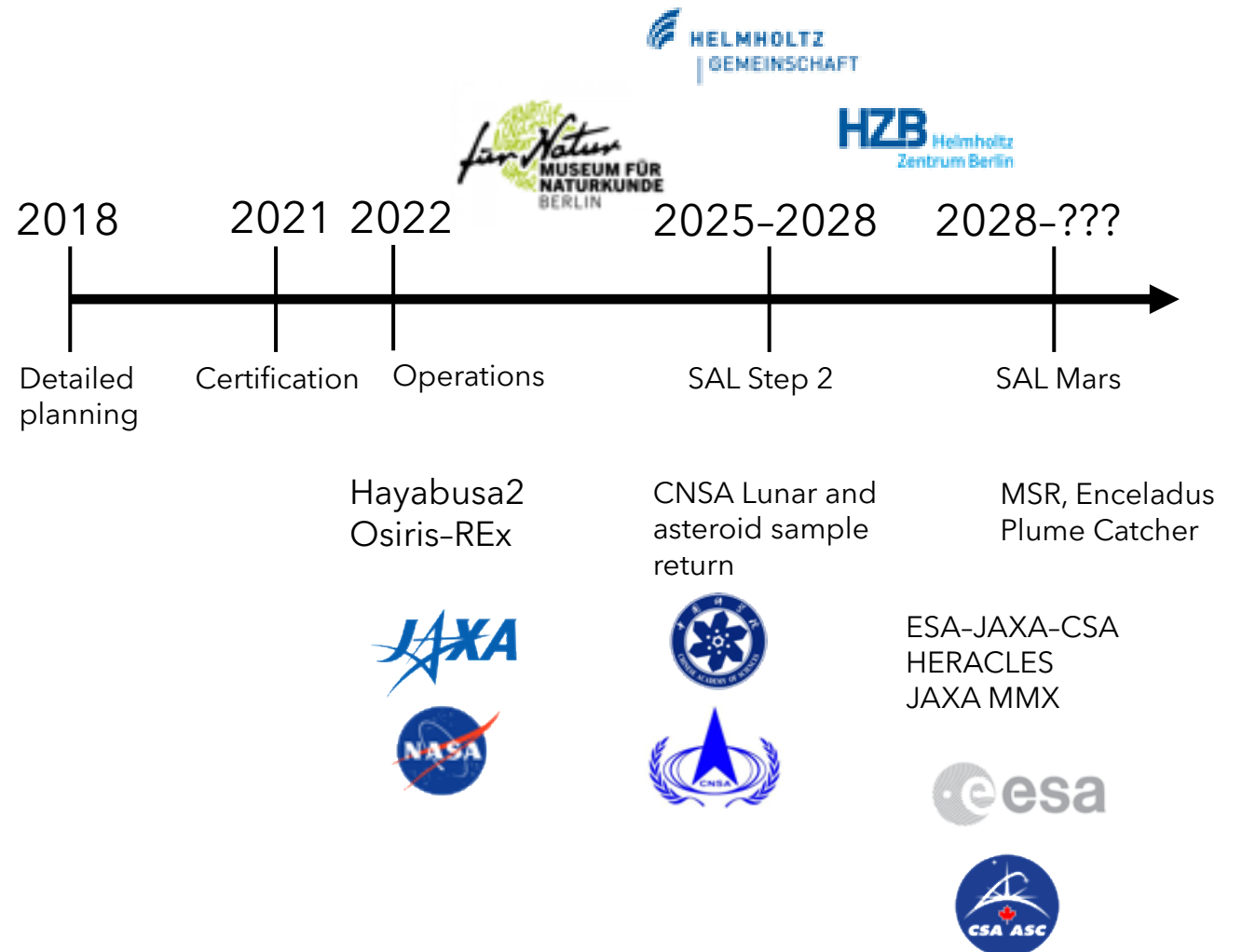
Sample Analysis Laboratory

Timeline

SAL should be operational by the end of 2022, on time to welcome samples collected by the Hayabusa2 mission.

It follows the approach of a distributed European sample analysis and curation facility as discussed in the preliminary recommendations of Euro-Cares.

A collaboration has been established with the Natural History Museum and the Helmholtz Center Berlin in Berlin aiming to establish an excellence center for sample analysis in Berlin within the next 5-10 years.



Outlook

DLR has started establishing a Sample Analysis Laboratory.

Following the approach of a distributed European sample analysis and curation facility as discussed in the preliminary recommendations of **EuroCares** the facility at DLR could be expanded to a curation facility.

Through the BIOMEX project a collaboration has been established with the Robert-Koch Institute (RKI) for question of samples that might pose a bio-hazard. RKI is operating BSL 4 facilities, which might be used as part of the DLR curation facilities.



Luna 24 sample, DLR

Acknowledgments

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Contacts: sal@dlr.de