

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

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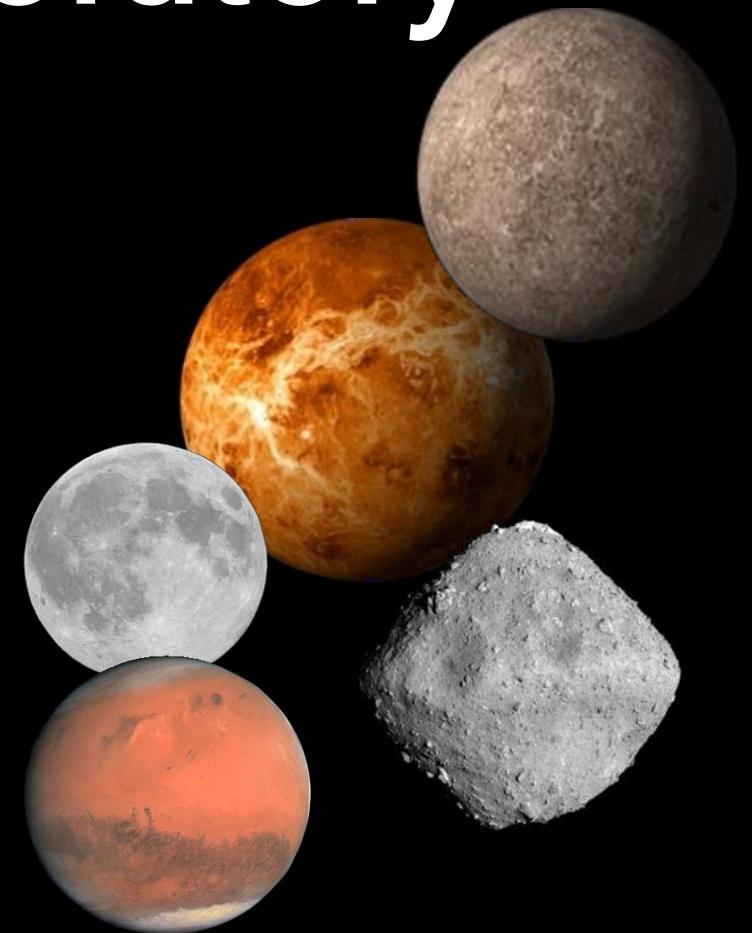
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DLR

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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
  - $\mu$ -XRD for *in situ* analysis and mapping
  - Non-ambient stage for dynamic experiments
- Polarized light microscope
- Supporting equipment for sample preparation and handling

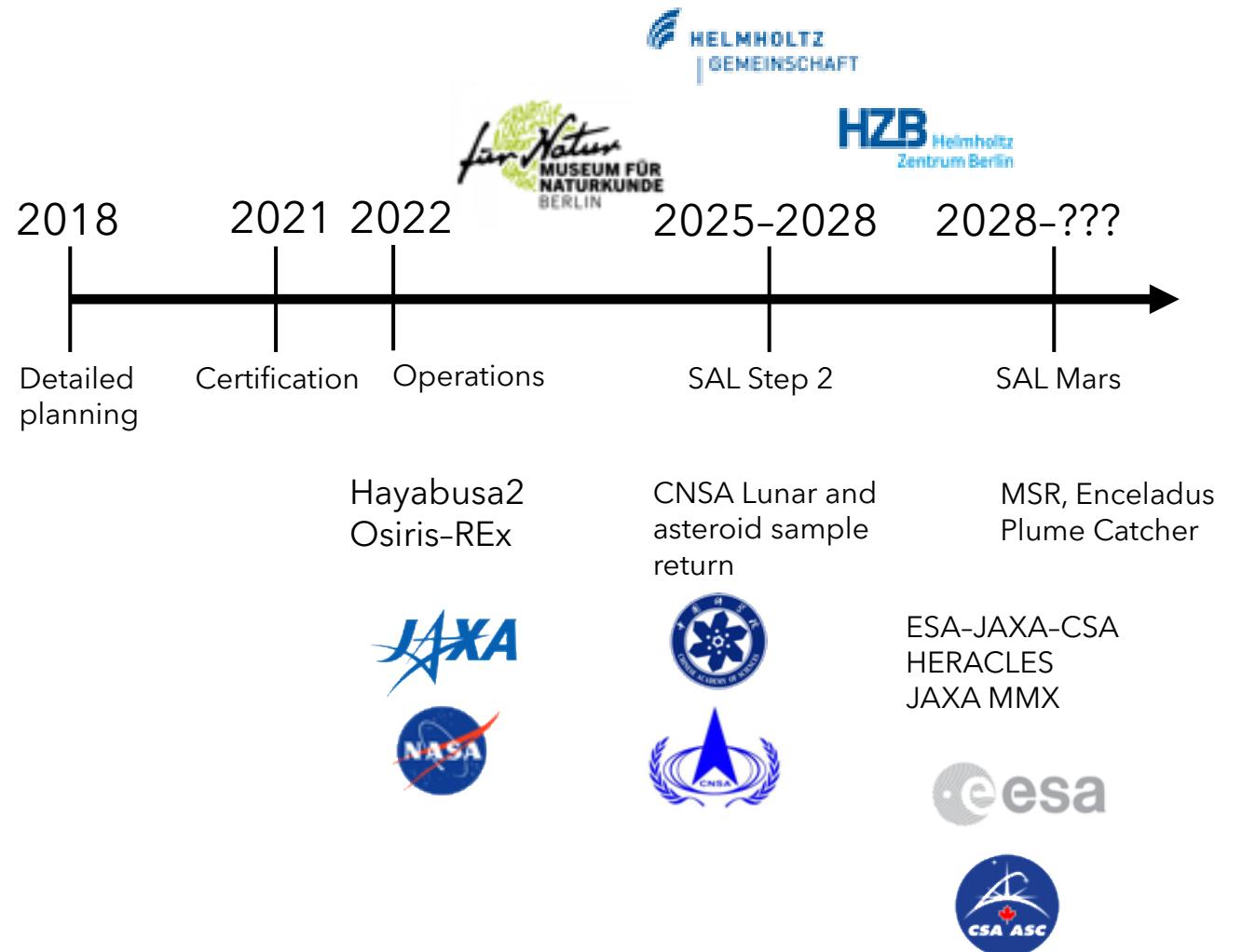
# Sample Analysis Laboratory

## 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

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