

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Small Bodies Missions and Technologies (Part 2) (4B)

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THE RAMAN SPECTROMETER ONBOARD THE MMX ROVER FOR PHOBOS

Abstract

We present the Raman spectrometer onboard the rover which will be part of JAXA's Martian Moons Exploration (MMX) mission, to be launched in 2024. The "Raman for MMX" (RAX) instrument is designed to identify the surface mineralogy of Phobos, according to the top-level science objectives of the MMX mission as defined by JAXA.

The RAX-instrument includes a laser, which has been developed for the Raman laser spectrometer (RLS) onboard the ExoMars2020 mission, a very compact and highly sophisticated optical assembly, and a lightweight, space-qualified CMOS detector (CMOS space camera 3DCM734, 3Dplus). The whole spectrometer requires a volume of only approximately $75 \times 95 \times 120 \text{ mm}^3$ and has a mass of less than 1.4 kg.

In-situ measurements of Raman spectra at different locations on Phobos will be realized by autonomously focusing the laser beam onto the ground below the rover. A calibration target is mounted inside the rover to provide frequency calibration prior to each measurement. This allows the identification of minerals on the surface of Phobos, validated by spectral analysis as well as by comparison with ground experiments and spectral laboratory reference data bases. The acquired data will be compared with the results obtained during the ExoMars2020 mission on the surface of Mars and thus help to better understand the origin of its moons.