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Author: Dr. Till Hagelschuer
German Aerospace Center (DLR), Berlin, Germany

Dr. Tomas Belenguer
Instituto Nacional de Tecnica Aeroespacial (INTA), Spain

Dr. Ute Böttger
German Aerospace Center (DLR), Berlin, Germany

Dr. Maximilian Buder
German Aerospace Center (DLR), Berlin, Germany

Dr. Yuichiro Cho
University of Tokyo, Japan

Dr. Enrico Dietz
German Aerospace Center (DLR), Berlin, Germany

Prof. Michael Gensch
German Aerospace Center (DLR), Berlin, Germany

Ms. Franziska Hanke
German Aerospace Center (DLR), Berlin, Germany

Prof. Heinz-Wilhelm Hübers
German Aerospace Center (DLR), Berlin, Germany

Dr. Shingo Kameda
Rikkyo University, Japan

Mr. Emanuel Kopp
German Aerospace Center (DLR), Berlin, Germany

Mr. Simon Kubitza
German Aerospace Center (DLR), Berlin, Germany

Dr. Andoni Moral
Instituto Nacional de Tecnica Aeroespacial (INTA), Spain

Mr. Carsten Paproth
German Aerospace Center (DLR), Berlin, Germany

Dr. Martin Pertenais
German Aerospace Center (DLR), Berlin, Germany

Mr. Gisbert Peter
German Aerospace Center (DLR), Berlin, Germany

Ms. Kristin Rammelkamp
German Aerospace Center (DLR), Berlin, Germany

Dr. Pablo Rodríguez Pérez
Instituto Nacional de Tecnica Aeroespacial (INTA), Spain

Prof. Fernando Rull
Universidad de Valladolid, Spain

Mr. Conor Ryan
German Aerospace Center (DLR), Berlin, Germany

Mr. Thomas Säuberlich

German Aerospace Center (DLR), Berlin, Germany
Mr. Friedrich Schrandt
German Aerospace Center (DLR), Berlin, Germany
Dr. Susanne Schröder
German Aerospace Center (DLR), Berlin, Germany
Dr. Stephan Ulamec
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
Prof. Tomohiro Usui
Japan Aerospace Exploration Agency (JAXA), ISAS, Japan
Dr. Roderick Vance
German Aerospace Center (DLR), Berlin, Germany

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.