

MMX InfraRed Spectrometer (MIRS) imaging spectrometer

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MIRS (MMX InfraRed Spectrometer) is an imaging spectrometer (in the range 0.9 - 3.6 microns) onboard of MMX mission, which will allow to characterize the Martian system and contribute to evaluate and select sampling site candidates. One of the main mission goals is to decipher the origin of the moons, which will provide important clues on planetary formation and how water is delivered to inner planets.

MIRS instrument is built at LESIA-Paris Observatory in collaboration with four other French laboratories (LAB, LATMOS, LAM, IRAP-OMP), with collaboration and financial support of CNES and close collaboration with JAXA and MELCO.

The instrument is designed to fully accomplish MMX' s scientific and measurement objectives. MIRS is expected to characterize Phobos and Deimos surfaces and Mars atmospheric composition by remotely identifying diagnostic features in the near-infrared range. MIRS is also expected to perform observations of dust storm, clouds, distributions of total amount of water vapor. These observations are expected to be performed over several successive days in different seasons.

MIRS performance requirement:

Spectral range: 0.9 –3.6 microns

Spectral resolution (sampled) < 20 (+10%) nm

Spectral sampling: 10 (+10%) nm

IFOV: less than 0.41 mrad, goal: 0.35 mrad

FOV: higher than $\pm 1.65^\circ$ SNR: higher than 100 in [2.7 - 3.2] microns in less than 2 sec integration, for 30 degrees solar incidence, at 1.5 au, with Lambertian albedo at 30 degree phase angle

Modulation Transfer Function shall be higher than 8% at Nyquist frequency in the spatial direction

MIRS boresight orientation with respect to MMX spacecraft shall be known with an accuracy better than ± 1.4 mrad.

MIRS boresight relative orientation between successive acquisitions of an observation sequence shall be known with an accuracy better than ± 0.17 mrad.

MIRS will be a fundamental instrument to evaluate sampling site candidates and support the selection of the two sampling sites on the Phobos surface. In conclusion, MIRS will allow compositional characterization of Phobos, Deimos and temporal characterization of particular phenomena of Mars atmosphere.

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