Mass Spectrometer for *In-Situ* Detection of Organics in Martian Soil

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We present details on the objectives, requirements, design, and operational approach of the core mass spectrometer of the Mars Organic Molecule Analyzer (MOMA) investigation on the 2018 ExoMars mission. MOMA is part of the ExoMars rover led by the Max Planck Institute in Germany (PI: Dr. Fred Goesmann). A NASA-Goddard-based team contributes the core ion-trap mass spectrometer and electronics. The MOMA mass spectrometer enables the investigation to fulfill its objective of analyzing the chemical composition of organic compounds in solid samples obtained from the near surface of Mars. Two methods of ionization are realized, associated with different modes of operation, in a single compact ion trap mass spectrometer. The first method uses electron ionization (EI) for analysis of derivatized organic compounds received from a gas chromatograph. The second method uses laser desorption ionization (LDI) for analysis of soil samples for higher mass organic compounds including prebiotic or possibly chemical compounds of biological origin. The stringent mass and power constraints of the mission have led to features such as low voltage and low frequency RF excitation and pulse counting detection. Two different types of ion trap, a 3-D and 2-D linear trap, are under investigation for performance.