

R009-33

Zoom meeting D : 11/2 PM1 (13:45-15:30)  
13:45-14:00

## **In situ observations of ions and magnetic field around Phobos: Mass Spectrum Analyzer (MSA) for Mars Moons eXploration (MMX)**

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The Mars Moons Exploration (MMX) mission will conduct remote-sensing and in-situ measurements and sample return for two primary science goals: 1) Reveal the origin of Mars' moons and gain a better understanding of planetary formation and material transport in the solar system; and 2), Observe governing processes of the Martian system to gain new insight on the history of the Mars system evolution. The science objectives are not only to reveal the origin of the Martian moons but also to understand physical processes in the Martian environment for investigating co-evolution of the Martian-moons system.

Mass Spectrum Analyzer (MSA) for the MMX mission will measure ions from the surface of the moons and Martian atmosphere with monitoring the solar wind ions and magnetic field. The MSA science investigation is designed to address MMX science goals related to in-situ ion and magnetic field observations in the Martian environment. To address the science goal 1), MSA will measure secondary ions such as Mg<sup>+</sup>, Si<sup>+</sup>, and Fe<sup>+</sup> emitted from the Phobos surface, as well as O<sup>+</sup>, OH<sup>+</sup>, H<sub>2</sub>O<sup>+</sup>, and H<sub>3</sub>O<sup>+</sup>, which originate from ice inside the Phobos if they exist. For the science goal 2), MSA will perform observations of incident ions to Phobos (H<sup>+</sup> and He<sup>++</sup> of the solar wind and O<sup>+</sup>, O<sub>2</sub><sup>+</sup>, etc. of the escaping Martian atmospheric ions), scattered solar wind ions, and emitted secondary ions.

We present the goals of the MSA science investigation, the conceptual design of the MSA instrumentation, and the current status of the development.