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The Lunar Adaptive Outpost for Remote Italian Experiments (LAORIE)

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Reduced atmospheric interference, the potential of stable and long-term observations free from Earth's Magnetosphere combined with tectonic stability and a field of view encompassing the entire Earth's disk make the Moon extremely attractive for observing the Earth and studying the Universe. The Earth-Moon-Mars (EMM) project aims to capitalize on these advantages.

EMM is an NRRP-funded project carried out by INAF, ASI and CNR, conceived to explore the Moon's potential as a multipurpose research laboratory and to develop innovative instruments for a range of in-situ lunar experiments, Earth monitoring and Universe observation. Specifically, EMM plans to deliver three main payloads to the Moon surface, which will be hosted on an ad-hoc lunar infrastructure: (i) the Lunar Electromagnetic Monitor in X-rays (LEM-X), an all-sky monitor for the X-ray band based on the concept of coded aperture camera; (ii) the LUNAr optical POLarimetry surveyor (LUNAPOL), a polarimeter for interstellar polarization survey; (iii) the Lunar Earth Temperature Observatory (LETO), a Fourier-transform spectro-radiometer in the infrared to monitor the brightness temperature of the whole Earth's disk.

While the opportunities offered by the Moon are valuable, the technical and logistical challenges that must be addressed to bring these instruments there and carry out measurements are critical, such as the harsh environment and the need for long-term reliability. In the EMM framework, the infrastructure named Lunar Adaptive Outpost for Remote Italian Experiments (LAORIE) addresses these challenges. A phase-A study carried out by ASI and TAS-I to develop this infrastructure, which will host the three payloads on the Moon's surface, is ongoing. In designing LAORIE, the team has been focusing on defining the necessary strategies to cope with different environmental challenges, including long periods of darkness, extreme temperature variations, lunar dust, and lack of atmosphere, as well as challenges posed by the launch and transport constraints and long-term durability and maintenance.

The contribution will provide an overview of LAORIE and its current development status.

Eligibility for "Best presentation for young researcher" or "Best poster for young researcher" prize

No

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