Contribution ID: **304** Type: **Parallel talk**

Next-generation lunar laser reflectors and applications for lunar GW detectors

Thursday 31 August 2023 14:15 (15 minutes)

We designed MoonLIGHT (Moon Laser Instrumentation for General relativity/geophysics High accuracy Tests), a single 100 mm-large next-generation lunar retroreflector for lunar laser ranging operations, able to support a millimeter range accuracy and below. MoonLIGHT and its automated, dual MoonLIGHT Pointing Actuator (MPAc) has been selected by ESA for launch in NASA's programs Commercial Lunar Payload Services and Payload and Research Investigations on the Surface of the Moon-1A (CP-11). MPAc will be flown to the Moon on-board the Nova-C lander of Intuitive Machines n.3 mission in April 2024. With its capabilities, MoonLIGHT will contribute to probe gravity through higher precision tests of general relativity and beyond, to improve lunar surface selenodesy, and to enhance our knowledge of the geophysical properties of the interior of the Moon. The imminent ESA and NASA lunar surface missions, like CP-11 in 2024, will establish a solid heritage for future opportunities employing retroreflectors like MoonLIGHT. In the next decade, the proposed lunar gravitational-wave detectors may benefit of this heritage to perform laser-interferometry based on retroreflectors like MoonLIGHT and its MPAc pointing actuators. Applications are proposed for international projects like Lunar Seismic and Gravitational Antenna (LSGA) and/or Laser Interferometer Lunar Antenna (LILA). For a reflector deployment with a rover, a robotic dust cover (under development by INFN) will also be beneficial.

Submitted on behalf of a Collaboration?

No

Author: MUCCINO, Marco (National Institute of Nuclear Physics (INFN) - National Laboratories of Frascati (LNF))

Co-authors: REMUJO CASTRO, Alejandro (INFN-LNF); MONDAINI, Chiara (INFN-LNF); DELLE MONACHE, Giovanni (INFN-LNF); VALLONE, Giuseppe (University and INFN of Padua); CHANDLER, John (University of California San Diego & Centre for Astrophysics); JANI, Karan (Vanderbilt University, Nashville, Tennessee); RUBINO, Laura (INFN-LNF); MAURO, Lorenza (INFN-LNF); SALVATORI, Lorenzo (INFN-LNF); PORCELLI, Luca (INFN-LNF); FILOMENA, Luciana (INFN-LNF); TRAINI, Marco (INFN-LNF); PETRASSI, Matteo (INFN-LNF); TIBUZZI, Mattia (INFN-LNF); MONTANARI, Michele (INFN-LNF); VILLORESI, Paolo (University and INFN of Padua); LOGNONNÉ, Philippe (Institut de physique du globe de Paris, Paris, Île-de-France); VITTORI, Roberto (INFN-LNF); CAPOZZIELLO, Salvatore (University and INFN Naples); DELL'AGNELLO, Simone (INFN-LNF); DENNI, Ubaldo (INFN-LNF)

Presenter: MUCCINO, Marco (National Institute of Nuclear Physics (INFN) - National Laboratories of Frascati (LNF))

Session Classification: Gravitational waves

Track Classification: Gravitational waves