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ASTRONOMY FROM THE MOON AND ILO-X

Abstract

International Lunar Observatory Association of Hawaii technology demonstrator / precursor ILO-X, a 600g dual imager instrument developed by Canadensys, is planned to operate on the Moon NET June 1 2022, working to capture first light of the Milky Way Galaxy center from the lunar surface near Vallis Schröteri (24.5N, 50.5W – launching on SpaceX Falcon 9, landing aboard Intuitive Machines Nova-C. ILOA has been working to conduct Astronomy from the Moon since its founding in 2007. Imagined since at least 1634 (Somnium, J. Kepler) and seriously advanced in the 1990s (D. Schrunk, B. Cooper 1999), the era of astronomy from the Moon is now being realized. First performed by John Young during Apollo 16, utilizing Far Ultraviolet Camera/Spectrograph (built by G. Carruthers), the resumption of astrophysical observation from the Moon began in 2013 with Lunar-based Ultraviolet Telescope (LUT) and continues on the lunar farside with Low Frequency Radio Spectrometer (LFRS) onboard the Chang'e-4 Mission (2019). As the international space community concentrates efforts towards establishment of permanent lunar operations formalized under ILRS and Artemis agreements, continuation and expansion of Astronomy from the Moon will provide a host of scientific, technological commercial and social benefits. A thin exosphere, farside radio quiet, planetary-like stability, low gravity, extractable volatiles for ISRU and near-term human settlement allowing for service make the Moon an attractive environment for astrophysical observation including long duration, high resolution observation of Earth (climate, atmosphere / magnetosphere, rotation, axial precession tracking) and Sun, parallax astrometric measurement, interferometry / VLBI radio arrays for extragalactic astronomy, and classical refractor and reflector telescopes freed from terrestrial constraints. Observation from the surface of the Moon will contribute greatly to achieving sufficient space situational awareness, enabling commerce, defense, navigation and communication in cislunar space including Lagrange points, while also nurturing the fundamental, deep-seated human need to look out from a higher vantage point.