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Ex Luna Scienta: The Lunar Occultation Explorer (LOX)

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The Lunar Occultation Explorer (LOX) is a paradigm shift - a next-generation mission concept that will provide new capabilities in time-domain nuclear astrophysics and establish the Moon as a platform for nuclear astrophysics. Currently under review by NASA's Explorer Program, LOX's performance requirements are driven by focused science goals designed to resolve the enigma of Type-Ia supernova (SNeIa) and their role in galactic evolution and cosmology. LOX will survey and continuously monitor the Cosmos in the MeV regime (0.1-10 MeV), a unique capability that supports both the primary science goals as well as multi-messenger detection and monitoring campaigns, by leveraging the Lunar Occultation Technique (LOT). Key benefits of the LOX/LOT approach include maximizing the ratio of sensitive-to-total deployed mass, low implementation risk, and demonstrated operational simplicity that leverages extensive experience with planetary orbital geochemistry investigations. LOX will also deliver a time-domain survey of the nuclear cosmos. Proof-of-principle efforts have validated all aspects of the mission using previously deployed lunar science assets, including the first high-energy gamma-ray source detected at the Moon. LOX mission design, performance, and science will be presented.

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