Ex Luna Scientia: The Lunar Occultation Explorer (LOX)
RICHARD MILLER, University of Alabama in Huntsville — The Lunar Occultation
Explorer (LOX) is a next-generation mission concept that provides new capabilities
for time-domain astrophysics and established the Moon as a platform for nuclear
astrophysics. Performance requirements are driven by Type-Ia supernova (SNeIa)
science goals that seek to revel details of these profoundly radioactive objects, in-
cluding their diversity. Primary science objectives include, but are not limited to,
probing the fundamental thermonuclear physics processes, performing a census of
progenitors and their explosion mechanisms, and evaluating the environmental con-
ditions and intrinsic systematics of these enigmatic objects. LOX provides new
capabilities for all-sky, continuous monitoring in the MeV regime (0.1-10 MeV) 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 im-
plementation risk, and demonstrated operational simplicity that leverages extensive
experience with planetary orbital geochemistry investigations; LOX also enables
long-term monitoring of MeV gamma-ray sources, a critical capability for SNeIa
science. Proof-of-principle efforts validated all aspects of the mission using pre-
viously deployed lunar science assets, and led to the first high-energy gamma-ray
source detected at the Moon. LOX mission performance, development progress, and
expectations for science investigations will be presented.

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