# Space Science Seminar
# Tuesday, 2017 November 28
# 10:30 a.m.
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## Space Probes of the Highest Energy Particles: POEMMA and EUSO-SPB

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Host: Dr. Mark Christl
(Sponsored by ST12)

Basic questions regarding ultra-high-energy cosmic rays (UHECRs) remain unanswered: What cosmic objects generate such extremely energetic particles that reach above $10^{20}$ eV (100 EeV)? What is this extreme acceleration mechanism? What is the corresponding neutrino flux? How do particles interact at extreme energies? Giant ground observatories, such as the Pierre Auger Observatory and the Telescope Array, have shown that UHECRs are extragalactic and have a surprising composition trend. Hints of anisotropies begin to appear at energies above ~60 EeV, just when statistics become very limited. We are designing and building space and sub-orbital missions to increase the statistics of UHECR observations at the highest energies. An international collaboration built the Extreme Universe Space Observatory (EUSO) on a super pressure balloon (SPB) to detect UHECR fluorescence from above. EUSO-SPB1 flew in the Spring of 2017. We are now planning EUSO-SPB2 to observe Cherenkov from UHECRs and inform the design of the POEMMA (Probe Of Extreme Multi-Messenger Astrophysics) space mission to discover the sources of UHECRs and observe ~100 PeV neutrinos.

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