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Gamma-ray and Neutron Spectrometers for Planetary Science Missions

Monday 30 September 2019 16:30 (45 minutes)

Gamma ray and/or neutron spectrometers have been flown on planetary spaceflight missions since the USSR's Luna-10 mission first used a gamma ray spectrometer to study the composition of the Moon from lunar orbit. Due to nuclear interactions with galactic cosmic rays (or a separate source of high energy neutrons), planetary materials emit gamma rays and neutrons that can be measured to determine the elemental composition of the planet down to ~ 1 meter below the surface. This subsurface composition information is critical to a better understanding of the planet's formation and evolution. This talk will be focused on the challenges surrounding the development of such gamma ray and neutron detectors for planetary science space missions. The physical processes that produce the planetary gamma rays and neutrons will be described along with the requirements for their detection. Detector design and development challenges will be discussed and examples of past and future missions will be presented to illustrate how these detectors must be tailored to specific mission architectures and planetary compositions.

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