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## Design and Simulation of the Assessing Lunar Ion-Generated Neutrons (ALIGN) Payload for Observing Cosmic Ray-Generated Epithermal Neutrons in the Lunar South Polar Region

The "Assessing Lunar Ion-Generated Neutrons" (ALIGN) payload is designed to monitor the particle radiation environment, in the lunar south polar region, for the Chang'E-8 lunar lander. The detector will monitor the rate of high energy cosmic rays-generated albedo neutrons created by their interactions in near-surface rocks. These albedo neutrons are sensitive to the local topography and composition of subsurface rocks; therefore, their detection is important for accurate assessment of the radiation environment and its variability, as well as for validation of simulation models of the radiation environment. The instrument will be mounted on the lander and will have three detector modules sensitive to thermal and epithermal neutrons, which will provide information on the directional distribution of this radiation component. This fixed system on the lander will provide a stable platform for the measurement of time variations of hazardous radiation. We will present the scientific objectives and technical design of the payload and GEANT4 simulations of geometrical acceptance and angular resolution, as well as the expected detection range and count rate. The effect of the environmental thermal neutrons, e.g., from the radioisotope heater unit (RHU), will also be discussed.

Collaboration(s)

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