

Estimation of Background Gamma Rays from Major Element for Spectroscopy by SELENE GRS

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Determining the chemical composition of lunar surface materials is very impotant for lunar prospecting. Spectroscopic measurement of line gamma rays from lunar surface provide us chemical information of the materials because excited nuclei in the materials emit gamma rays at their inherent energies. A gamma ray spectrometer (GRS) onboard SELENE to be luanced in 2007 has a germanium detector, which has an energy resolution and sensitivity superior to all other gamma-ray detector. The GRS will provide high quality information of the chemical composition of the lunar surface, as we have never obtained before, by the remote sensing method. There are interferences of background gamma rays from the spacecraft body, which are mainly from natural radioactives, cosmic-ray-excited nuclei and also nuclei excited by secondary neutrons from the Moon. Major elements in lunar materials such as Al, Si and Ti also are used in ambient materials of the GRS. For precise estimation of lunar surface materials, the interference of such background gamma rays needs be appropriately removed from the observation. Using Geant4 Monte Carlo code, we calculated the background gamma rays from the ambient materials of the GRS including the spacecraft body. The performance of the spectrometer was simulated and the uncertainty of the concentrations for major elements in the lunar surface were estimated.