

Evaluation of radiation tolerance of electronics parts used for the ultra-small mission

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In the space environment, spacecraft is exposed to radiation and degrades the data. For example, the increase of dark current, and change in current consumption.

Recently, the university-made ultra-small spacecraft mission become popular. The mission in this class can reduce the cost and time by using commercial products. However, these commercial products are thought to have no radiation tolerance. Then, it is necessary to be tested with the radiation total dose which is calculated using the Monte Carlo simulation.

We are developing the extreme ultraviolet imager PHOENIX onboard the ultra-small satellite EQUULEUS which will be launched in 2020. Helium ions in the Earth's plasmasphere emit extreme ultraviolet light (wavelength of 30.4 nm) through the solar resonance scattering. PHOENIX observes them from the moon (Earth-Moon L2 point).

The radiation tolerance has been evaluated with a gamma irradiation facility with cesium 137. In this presentation, we show the gain characteristics and change of electric noise with respect to radiation of semiconductor elements used in PHOENIX instrument.