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Feasibility Study of the Real-time Proton Flux Monitoring System for Space Radiation Environment Test By Using a 100 MeV Proton Irradiation Facility

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Protons are dominant radiation source in the space environment causing radiation effects such as SEE(Single Event Effects), DD(Displacement Damage) to EEE(electrical, electronics and Electromechanical) parts of spacecraft. Until now, radiation effect test for space EEE parts have been carried out by using a 100 MeV proton irradiation facility (BL102) at KOMAC(Korea Multi-purpose Accelerator Complex). For this kind of the accelerated ground test of such radiation effects on devices to predict their performance in space, the new space radiation environment simulation apparatus, which can simulate ultra high vacuum and thermal cycling (-55 to +125 celcius degree) as well as 100 MeV proton irradiation, have been developing under way. For the new space environment test for space EEE parts, the Determination of dose or Fluence is the key parameter. Although the BL102 facility usually provide the the users the beam intensities range from 1E6 to 1E8 protons [cm-2 s-1], In order to match the demand of the space testing community of the South Korea, the new real-time beam flux monitoring system was developed by the combination of the high sensitivity in-air ACCT(AC current transformer) and the Bragg peak chamber detector which have the measurable range from 1E4 to 1E8 protons [cm-2 sec-1] and the beam flux can be measured by the pulse to pulse in real time. In this paper, new space radiation environment test apparatus and its beam flux monitoring system will be introduced.

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