SIMULATION STUDY OF THE CALET INSTRUMENT AT THE JAPANESE EXPERIMENT MODULE ON INTERNATIONAL SPACE STATION

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We have carried out simulation study on the CALET (CALorimetric Electron Telescope) instrument to optimize the performance for electron measurement up to 10 TeV. Basic idea of the CALET is brought from the balloon-borne electron telescope with scintillating fibers (BETS). In order to get additional rejection power of a magnitude of 2, the CALET is composed of the BETS-type imaging calorimeter and the total absorption calorimeter which consists of 2.5 cm×2.5 cm×30 cm BGO logs. Using simulation, the thickness of material is optimized in a restricted weight of the total payload, 2,500kg.
Monte Carlo Simulations were performed by using the EPICS code developed by one of the authors (K.Kasahara). In this code, the results of electro-magnetic process has been compared with a major simulation code, GEANT, and the reliability is completely proven. The nuclear interaction model was simulated by the Fritiof code modified for the nuclear targets. The simulation results were also compared with the beam tests of BETS.
By the analysis of the simulated events, we have confirmed the performance of the CALET as following: The proton rejection power is as much as 10^6 with the BGO thickness of 35 cm (32 r.l.). Energy of electron is derived from the BETS-type and total absorption calorimeter with energy resolution of $\sim 10\%/\sqrt{E/10\mathrm{GeV}}$. Incident angle of electron is determined by the BETS-type imaging calorimeter with angular resolution of $<$1 deg.
In this paper we present the simulated performance of the CALET which has a capability to observe cosmic ray electrons in the energy range from 10 GeV to 10 TeV. We will also report about the performance for measuring the gamma-rays from 1 GeV to 1 TeV.