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Event selection technique of multi-layer Si-CdTe Compton camera onboard Hitomi

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The multi-layer semiconductor Compton camera has been developed by Japanese group for many years and finally, the soft gamma ray detector (SGD) onboard Hitomi, Japanese astronomical satellite has been launched and successfully operated in the orbit. SGD consists of combination of narrow field of view Si-CdTe multi-layer Compton camera and surrounding $Bi_4Ge_3O_{12}$ (BGO) active shield. Such unique concept enable us to perform astronomical observations in 60 to 600 keV band with the highest sensitivity by minimizing background.

Tracking information of Compton camera is used to reconstruct direction and energy of incoming events and it is essential to investigate an appropriate criteria to distinguish the real astronomical signals and in-oribit background from very large number of combinations of detected signals to perform highly sensitive observations.

The efficient event selection technique to reduce the background is developed in this study by comparing observed astronomical source data and background data for the first time. Various reconstructed parameters such as deposit energy, scattering angle, hit position, ..etc have been compared between source and background observations. Furthermore, layered configuration of Compton camera is also useful to extract cosmic-ray particle events which show a straight line

trajectory. Deposition energy of such cosmic-ray particle events is found to be almost consistent with that of minimum ionizing protons and hit pattern of such particle event can be used to on-board veto for efficient data acquisition. In this contribution, those event selection technique of Compton camera applied to in-orbit data is demonstrated.

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