Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

Pulse shape analysis for Ge semiconductor Compton camera TOMONORI FUKUCHI, SHINJI MOTOMURA, YOUSUKE KANAYAMA, SHIN'ICHIRO TAKEDA, HIROMITSU HABA, YASUYOSHI WATANABE, SHUICHI ENOMOTO, RIKEN — The Compton camera has found applications in many fields such as medical imaging, astrophysics, environmental monitoring and nuclear non-proliferation. We are developing a γ-ray Compton camera for medical use of multiple molecular imaging, which we call GREI (Gamma-Ray Emission Imaging). The GREI system consists of two double-sided orthogonal-strip high-purity germanium semiconductor detectors. Each detector can detect the interaction position and deposited energy of γ ray, and γ-ray source distributions can be visualized based on Compton scattering kinematics. In order to improve the imaging resolution of the GREI, a pulse shape analysis techniques is under development. In general for the segmented semiconductor detector, its output pulses have variety of the shapes depending on the γ-ray interaction positions. Therefore, by analyzing the pulse shape, interaction position of γ-ray interaction can be extracted. Especially, analyzing not only pulse shape appearing in γ-ray hit segment but also transient signals in neighboring segments, 3D interaction position within the electrode can be extracted. We implemented a pulse shape analysis system for GREI and succeeded to extract 3D interaction position in sub-millimeter order. Consequently, imaging resolution is vastly improved.

Tomonori Fukuchi
RIKEN

Date submitted: 01 Jul 2009 Electronic form version 1.4