



Contribution ID: 6

Type: Talk

Handy Compton camera using 3D position-sensitive scintillators coupled with large-area monolithicMPPC arrays

Wednesday, 13 February 2013 09:25 (20 minutes)

One year after Japan's nuclear disaster, the invisible threat of radiation lingers around homes and businesses near the Fukushima Daiichi Nuclear Plant. Various gamma cameras are being developed and are now undergoing careful field tests. Although some are compact, the detector weight still exceeds 10 kg due to the thick mechanical collimator. Other models use electronic collimation but have relatively poor sensitivity especially for ^{137}Cs and ^{134}Cs gamma rays. We are developing a novel Compton camera weighing only ~ 1 kg and just ~ 10 cm cubic in size. Despite its compactness however, the camera realizes wide 180 deg vision with its sensitivity ~ 50 times superior to other cameras being tested in Fukushima. We expect that a hotspot producing a 5 micro-Sv/h dose at a distance of 3 meters can be imaged every 10 sec. The prototype camera consists of two identical 1 cm cubic 3D position-sensitive scintillation detectors (Ce:GAGG), developed through key in-house technology. By measuring the pulse-height ratio of MPPC-arrays coupled at both ends of a scintillation crystal block, the depth of interaction is obtained as well as the usual 2D positions. The average energy resolution of 10 % was obtained with the angular resolution better than 10 deg (FWHM) for 662 keV gamma rays. These results suggest that this gamma camera design is versatile and offers promise in various applications; not only as a survey device but also for nuclear medicine and high energy astrophysics.

quote your primary experiment

high energy astrophysics

Primary author: KATAOKA, Jun (Waseda University)

Co-authors: Mrs KISHIMOTO, Aya (Waseda University); Mr TAKEUCHI, Kenshiro (Waseda University); Mr HIRAYANAGI, Masato (Hamamatsu Photonics K.K); Mr OHSUKA, Shinji (Hamamatsu Photonics K.K); Mr ADACHI, Shunsuke (Hamamatsu Photonics K.K); Mr NAKAMURA, Sigeyuki (Hamamatsu Photonics K.K); Dr NAKAMORI, Takeshi (Waseda University); Mr FUJITA, Takuya (Waseda University); Mr KATO, Takuya (Waseda University); Mr NISHIYAMA, Toru (Waseda University)

Presenter: KATAOKA, Jun (Waseda University)

Session Classification: Scintillating Detectors