Contribution ID: **123** Type: **Oral**

High sensitivity observation for celestial MeV gamma rays by Electron Tracking Compton camera with a balloon borne experiment

Wednesday 4 June 2014 16:40 (20 minutes)

For next MeV gamma-ray astronomy, we developed Electron Tracking Compton Camera (ETCC) consisting of a Time projection Chamber and pixel scintillators. By measuring the track of an electron, ETCC measures the direction of gamma-rays as a small arc, which provides a good background rejection using the kinematical test and energy loss rate of the track (particle identification), and clear imaging. Already we revealed its strong background rejection ability by the balloon experiment (a 10cm-cube ETCC: SMILE-I) in 2006, where 98% background events were removed. In 2013 we completed a 30cm cube ETCC to catch gamma-rays from Crab in next SMILE-II balloon experiment with >5shigma for several hours. The tracking efficiency was improved with 10 times, which enables to select the Compton event in TPC using only the energy loss rate of the track with distinguishing it from all backgrounds. Thus, we can extract the maximum detection efficiency expected by the simulation. Also SPD angle provides a several times better contract in image than conventional Compton method. Then, SMILE-II would provide a 5times better sensitivity than COMPTEL with the use of 3atm CF4 gas, and 40cm-cube ETCCs onboard satellite is expected to reach near 10-12 ergcm-2s-1. To verify this performance, SMILE-II was irradiated by secondary gammas and neutron from water target using 140MeV proton beam, and measured the clear image of a weak source under 10times stronger radiation than that in the balloon altitude.
Here we will present the detail of the SMIEL-II performance including this beam test.

Author: TANIMORI, Toru (Kyoto University)

Co-authors: Dr TAKADA, Atsushi (Department of Physics, Kyoto University, Kyoto, Japan); Dr TOMONO, Dai Tomono (Department of Physics, Kyoto University, Kyoto, Japan); Prof. KUBO, Hidetoshi (Department of Physics, Kyoto University, Kyoto, Japan); Dr PARKER, Joseph (Department of Physics, Kyoto University, Kyoto, Japan); Dr MIUCHI, Kentaro (epartment of Physics, Kobe University, Japan); Dr NAKAMURA, Kiseki (Department of Physics, Kyoto University, Kyoto, Japan); Mr ODA, Makoto (Department of Physics, Kyoto University, Kyoto, Japan); Dr SONODA, Shinya (Department of Physics, Kyoto University, Kyoto, Japan); Mr NAKAMURA, Shogo (Department of Physics, Kyoto University, Kyoto, Japan); Mr KOMURA, Shotaro (Department of Physics, Kyoto University, Kyoto, Japan); Dr MIZUMOTO, Tatsuya (Research Institute for Sustainable Humanosphere, Kyoto Univ.Japan); Mr SAWANO, Tatsuya (Department of Physics, Kyoto University, Kyoto, Japan); Mr MATSUOKA, Yoshihiro (Department of Physics, Kyoto University, Kyoto, Japan); Dr MIZUMURA, Yoshitaka (Department of Physics, Kyoto University, Kyoto, Japan)

Presenter: TANIMORI, Toru (Kyoto University)

Session Classification: II.b Astro & Space

Track Classification: Experiments: 2b) Astrophysics and Space Instrumentation