Contribution ID: **60** Type: **Contributed Talk**

Development of an Electron-Tracking Compton Camera using CF4 gas at high pressure for improved detection efficiency

Saturday 20 February 2010 12:50 (25 minutes)

In MeV gamma-ray astronomy, the only observation by a Compton camera, COMPTEL, succeeded. The sensitivity of COMPTEL is, however, worse than those of detectors in the X-ray and other gamma-ray regions for the large background. Therefore a Compton observatory with better sensitivity is required.
We have developed an Electron-Tracking Compton Camera (ETCC) consisting of a gaseous micro Time Projection Chamber (μTPC) and a GSO(Ce) scintillation camera surrounding the μTPC. The μTPC, based on a GEM and a micro-pixel chamber (μPIC) whose pitch is 400 μm, measures the recoil electron, and the Compton scattered gamma-ray is measured by the scintillation camera. Thus, the ETCC is able to reconstruct the incident direction for a single photon. Several prototype ETCCs with a detection volume of about 10 × 10 × 10 cmˆ3 filled with an Ar/C2H6 (90:10) gas mixture at 760 Torr were developed and their performances were studied.
In order to achieve a sensitivity 10 times better than that of COMPTEL, we are developing an ETCC with μTPC using CF4 gas and at a higher pressure. We are developing the ETCC with μTPC using an Ar/CF4/iC4H10 (54:40:6) mixture at 1520 Torr which is expected to have a sensitivity over 3 times better than that of our prototypes.
In this presentation, we will report the basic characteristics such as gains, drift velocities, energy resolutions, and position resolutions measured with the μTPC and angular resolutions and detection efficiencies measured with the ETCC.

Summary (Additional text describing your work. Can be pasted here or give an URL to a PDF document):

http://www-cr.scphys.kyoto-u.ac.jp/member/michiaki/pdf/VCI2010_Summary_takahashi.pdf

Primary author: Mr TAKAHASHI, Michiaki (Japan)

Presenter: Mr TAKAHASHI, Michiaki (Japan)

Session Classification: Applications 2