The Observation of Diffuse Cosmic and Atmospheric Gamma Rays with an Electron Tracking Compton Camera loaded on a Balloon


1. Observation in MeV γ-ray Astronomy

- Universe in MeV gamma ray
- Galactic plane: Spacecraft (G), Fe (173/1333)
- Acceleration
- Jet (AGN, GRB)
- Synchrotron radiation
- Inverse Compton scattering
- Strongly relativistic Potential
- Gamma-ray pulsar
- Solar flare
- Black Hole: accretion disk, x-ray
- SNR

2. Electron Tracking Compton Camera

- Electron Tracking Compton Camera (ETCC)
- The camera consists of a gaseous time projection chamber, which detects the track and energy of the recoil electron, and a scintillator, which detects the absorption point and the scattered gamma-ray energy.
- By the detection of the direction of the recoil electron, we can reconstruct the Compton scattering completely and obtain the fully reconstructed gamma-ray image.
- Angular resolution
- Position resolution
- Energy resolution

3. Performance of 1st FM Detector

- Detection efficiency
- Field of view
- Energy range
- Angular resolution

4. 1st Flight of SMILE

- Sub-MeV gamma-ray Imaging
- Loaded-on-balloon Experiment

5. Results

- Detection of gamma-ray event
- Number of the reconstructed events
- ~2000 events during this flight
- ~800 events in the level flight
- ~620 downward events (60° ~ 66°)

6. Present Work for Next Balloon

- 30cm cube μ-TPC
- GSO Array
- 30cm MeV camera prototype