Diffuse Hard X-Ray/Gamma-Ray Emission from Galaxy and local group of galaxies

T. Mizuno, T. Takahashi, H. Takahashi, H. Katagiri, Y. Fukazawa and T. Ohsugi (Hiroshima Univ.)

Abstract:
Diffuse gamma-ray emission in galaxies in energy of about 100 MeV or more is produced by cosmic-ray interactions with the interstellar medium and photons. Diffuse hard X-rays above 10 keV may also originate from non-thermal cosmic-ray electrons and reflect the distribution of electron component of cosmic-rays. Therefore a study of spectrum and spatial distribution of diffuse emission in hard X-rays and gamma-rays is a key to understand cosmic-ray and matter distributions in each galaxy.

The Gamma-ray Large Area Space Telescope (GLAST) has an unprecedented sensitivity and will enable us to study the diffuse gamma-ray emission from Galaxy in detail and investigate a couple of local group galaxies in addition to the Large Magellanic Cloud (LMC) which has already been detected by EGRET. Here we show performance estimates of GLAST on local group galaxies based on the latest simulation. We also present an RXTE view of galactic diffuse hard X-rays and compare with gamma-ray data by EGRET.

Conclusions:
• Hard X-rays and gamma-rays are important tool to study cosmic-ray and matter distributions in galaxies.
  ➢ The Galaxy.
  ➢ Spectrum and morphology is essential to study the origin.
  ➢ GLAST will enable us to study matter/cosmic-ray distributions in detail.
• Nearby galaxies: GLAST will allow us to compare cosmic-ray fluxes among galaxies.
  ➢ Careful analysis is required to study extended sources like LMC.