

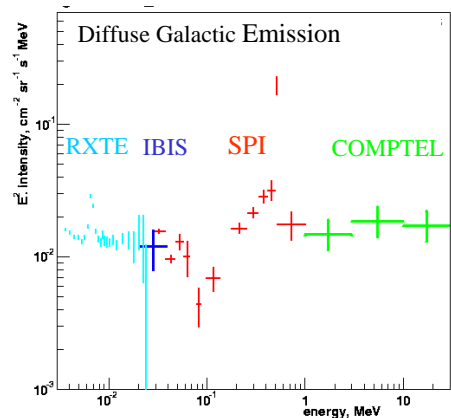
Images and spectra of hard X-ray/soft γ -ray emission from the inner Galaxy have been obtained using the first year and a half of data from INTEGRAL/SPI. Diffuse emission has been clearly separated from sources. The images are the first ever made of diffuse emission at these energies.

The Galactic ridge is an intense emitter of hard X-rays and soft γ -rays, but their origin is as yet unclear. The study of this emission is a major goal of INTEGRAL, whose unique combination of angular and spectral resolution and sensitivity give it great advantages over previous missions.

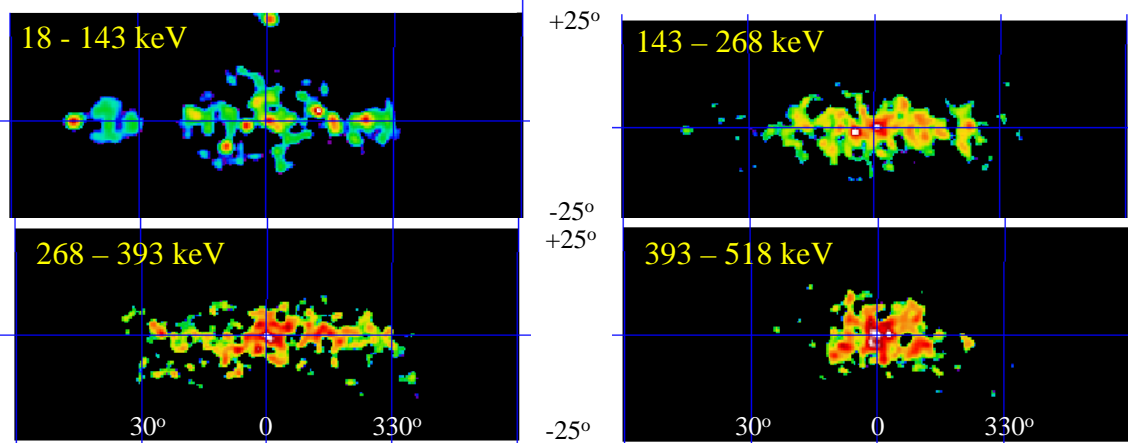
The IBIS instrument on INTEGRAL has successfully separated sources from diffuse emission in the 20 – 40 keV band (Lebrun et al. 2004). Now with SPI we are able to extend the analysis to 1 MeV. Data from the Core Program of the first 1.5 years of the mission have been used. The spectrum is derived by model fitting to components tracing Galactic structure: HI, CO and a model for the positronium continuum around the Galactic centre. In addition, at low energies the 91 sources detected by IBIS are included; IBIS positions are used and the source fluxes are determined from the SPI data. The instrumental background is represented by a template which is scaled by a time-dependent factor.

Diffuse emission is $\sim 10\%$ of the total emission integrated over the inner radian of the Galaxy at low energies, and the fraction increases with energy to at least 50%.

The spectrum of diffuse emission is consistent with previous work (RXTE, OSSE, COMPTEL), but is more robust because of the explicit inclusion of many sources and the imaging properties of SPI. The positronium continuum is clearly detected as the excess between 300 keV and the 511 keV line. *In situ* acceleration of suprathermal electrons has been proposed as the origin of the remaining non-thermal component (Dogiel et al. 2002).



Images have been made using the maximum-entropy method, the first ever made at these energies. These show the sources dominating at low energies while the diffuse emission is visible from the Galactic ridge at higher energies. The band 393-518 keV shows a concentration to the Galactic centre and an elliptical form consistent with positronium emission.



References:

- Dogiel, V.A., Inoue H., Masai, K., Schönfelder, V., Strong, A.W. (2002) ApJ, 581, 1061
- Lebrun, F. et al. (2004) Nature, 428, 293
- Strong, A.W., et al. (2003) A&A 411, L127 ; 411 L447; (2004) ESA SP-552, astro-ph/0405023