The MeV Point-Source Sky during the COMPTEL Mission

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Abstract
The COMPTEL experiment aboard CGRO pioneered the MeV sky (0.75 – 30 MeV) between 1991 and 2000. The 1. COMPTEL source catalog (Schönfelder et al. 2000), covering roughly the first 6.5 years of the mission, lists 32 steady MeV sources. To improve on that, we reanalyse consistently all COMPTEL data from the beginning to the end of the mission by carrying out all-sky point source analyses in different energy bands for different time periods (sum of all data as well as subdivisions). The goal of the analyses is to derive 1) a consistent survey on MeV sources for the complete mission, and 2) the variability behaviour (light curves, spectra) for the brighter and more significant MeV sources. These results shall finally be summarized in a 2. COMPTEL source catalog. Up to now, we found clear evidence for several new source detections (i.e. not listed in the 1 COMPTEL source catalog), unidentified as well as known ones (e.g. spatially coincident with EGRET sources).

In this poster we show, for the first time, all-mission all-sky maps (i.e. they contain all mission data from the first to the last COMPTEL observing period – in the 3 (1.1, 3-10, 10-30 MeV) standard COMPTEL bands. The time-average strongest MeV sources are visible. Apart from known Gamma-ray sources, there is evidence for unknown source features. Whether these are real source features or analysis artifacts is currently investigated. The visible sources should be prime candidates (especially in the 1-3 MeV band) for INTEGRAL detections around or above 1 MeV emission is essential. To account for that, we included 3 global components and of several (up to 7) sources simultaneously.

Method
To carry out these systematic source searches, we generated all-sky maps in galactic coordinates for different energy bands and time periods. To account for the distortions of maps near the galactic north and south poles (see below), the analysis procedure applied the standard COMPTEL maximum-likelihood method, which generates skymaps and determines source parameters, like detection significances, fluxes, and flux errors. An estimate for the instrumental background of COMPTEL is derived by using the standard filter technique in the COMPTEL data space (Bloemen et al. 1994). For the analysis, especially along the galactic plane, the handling of the diffuse emission is essential. To account for that, we included 3 global models (see Figure), which represent the galactic diffuse emission (HI+CO, and inverse Compton) and the isotropic extragalactic emission in the fitting procedure. For each energy band, the scaling factor for the extragalactic model was fixed to values integrated from its spectral shape at MeV energies (derived by Weidenspointner 2000), while the scaling factors for the galactic diffuse models (HI+CO, IC) were simultaneously fitted with the fluxes of the most prominent sources. By this method we derive for each energy band best-fit flux values of the 2 galactic diffuse components and of several (up to 7) sources simultaneously.

References
Weidenspointner, G. 2000, MPE PhD Thesis

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