Population Studies of Fermi LAT Galactic sources

The Fermi Large Area Telescope (LAT) has been detecting hundreds of Galactic sources, most of which are pulsars. Many Galactic sources are still undetected or unresolved due to their low flux, below the Fermi LAT sensitivity, or because of foreground and source confusion. Moreover, among the many unassociated sources, which are about one third of the detected sources, a large amount may have Galactic origin. We present our method of source population synthesis studies for characterizing the general properties of Fermi LAT Galactic gamma-ray sources and for estimating the number of Galactic sources below the Fermi LAT flux sensitivity threshold. Source density distribution and luminosity function of our Monte-Carlo simulation are constrained by the Galactic sources detected by Fermi LAT. Then, the number of unresolved sources and their contribution to the diffuse emission are estimated by our best model.

This is a long-term project on analyzing the point source catalog and performing theoretical studies of gamma-ray sources. Apart from being interesting on its own, characterizing the general properties of detected sources also allow us to estimate the contribution to the diffuse emission from undetected and unresolved sources. In turn this help their detection, impacting also other studies of diffuse gamma rays including studies of the interstellar emission and dark matter. Finally, it also helps in the characterization of unassociated sources.