

## Probabilistic classification of Fermi LAT sources

Classification of sources is one of the most important tasks in astronomy and astrophysics. About one third of sources in Fermi LAT catalogs are unclassified due to absence of plausible associations. We determine probabilistic classification of unassociated sources in 3FGL and 4FGL catalogs using machine learning methods trained on associated sources. We argue that probabilistic classification can be used not only to determine the most likely classes of sources, but also to perform population studies by taking into account all unassociated sources weighted by the classification probabilities. For example, the expected density of active galactic nuclei (AGNs) including unassociated sources weighted by probabilities is approximately isotropic, while the density of either associated AGNs or most likely AGNs among unassociated sources has a dip in the Galactic plane. Another application of the probabilistic catalogs is the estimation of the number of pulsars or other Galactic sources among the unassociated sources.

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