Population synthesis of Fermi LAT sources: A Bayesian analysis using posterior predictive distributions

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Summary

Fermi-LAT has provided an unprecedented view of the gamma-ray sky and in particular has found a host of previously unknown point sources, i.e. the 3FGL. Of the 3033 objects in the 3FGL, 1010 remain unassociated to a particular source class. To create effective follow up surveys of these objects it is essential to make probabilistic statements about the potential class of an individual source. We present a statistically rigorous method of analysing the entire 3FGL data set to provide constraints on spatial distributions, luminosity functions, and spectral shapes whilst also providing "semi heirachical"posteriors for the association of a source to different classes of objects. We do this by combining the power of an unbinned likelihood analysis and generation of the posterior predictive distribution in a Bayesian framework. In this talk I will present our method and discuss its results in the context of the potential population of millisecond pulsars towards the galactic centre.

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