Contribution ID: **45** Type: **not specified**

Locating γ-Ray Sources on the Celestial Sphere via Modal Clustering

Wednesday, 13 September 2023 16:00 (1h 30m)

Searching for as yet undetected γ-ray sources is a major target of the Fermi LAT Collaboration. This type of high-energy photon emission typically presents itself as a highly concentrated point-like spot in the whole sky map, which blends in with the irregularly shaped background emission spread over the entire area. The identification of high-energy emitting sources is a fundamental task to better understand the mechanisms that both create and accelerate particles emitted by celestial objects. We discuss the application of nonparametric clustering for γ-ray source detection via an adjustment of the mean-shift algorithm to the directional nature of the data. The issue of selecting the smoothing amount is addressed adaptively, by combining scientific input with optimal selection guidelines, as known from the literature. Using statistical tools from hypothesis testing and classification, we furthermore present an automatic way to skim off sound candidate sources from the γ-ray emitting diffuse background and to quantify their significance. Efficient tools to account for the computational burden required to analyse huge amounts of data are also discussed. Our method was calibrated on simulated data provided by the Fermi LAT collaboration and will be illustrated on a real Fermi LAT case-study.

Joint work with Alessandra R. Brazzale and Giovanna Menardi (both from University of Padova).

Primary author: MONTIN, Anna (Alira Health)

Presenter: MONTIN, Anna (Alira Health)

Session Classification: Poster session