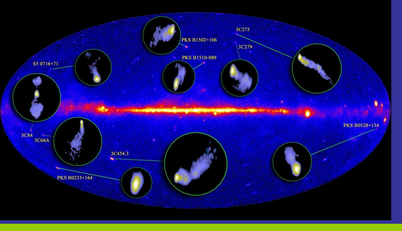

Parsec-scale radio emission of jets in *Fermi* LAT detected AGN

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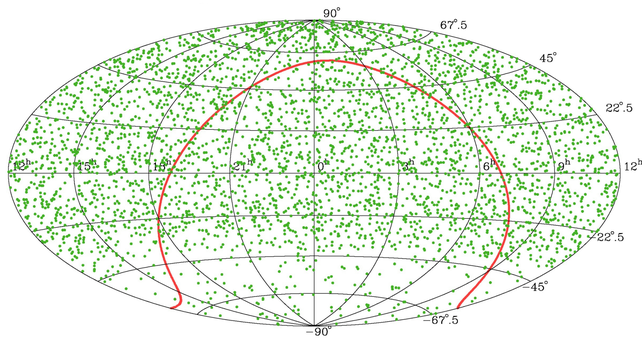
It is found that γ-ray properties of AGN are closely related to parsec-scale radio emission of their jets.

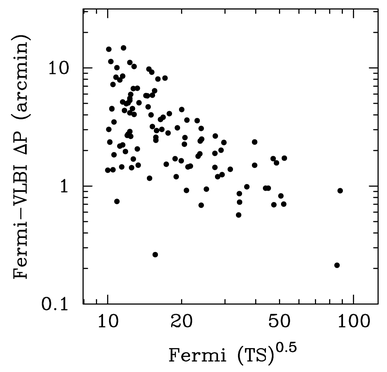
Abstract

A comparison of positions from the *Fermi* LAT 3 months list with positions of VLBI-selected extragalactic jets has yielded bright VLBI counterparts for the majority of *Fermi* detections. This includes six new associations located within 10 deg from the galactic plane. Further analysis has shown that γ-ray properties of AGN are closely related to parsec-scale radio emission of their jets. A positive correlation is found between γ-ray photon flux and parsec-scale radio flux density, measured quasi-simultaneously. Gamma-ray selected AGN appear to have brighter and more compact jets in the radio band, suggesting that they might have higher Doppler factors than other blazars. Correlations found between the temporal radio and γ-ray variability suggest that the prominent flares in both bands are produced in the parsec-scale jet core regions, typically within an apparent time separation of up to a few months. These results indicate that relativistic beaming of the parsec-scale jet emission is important in both the low- and high-energy bands.

Fermi – VLBI cross-identification

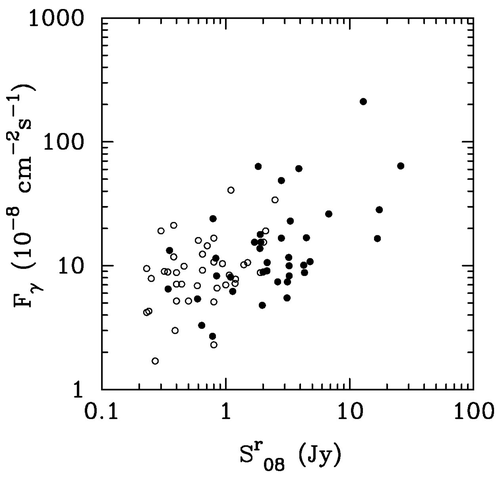


VLBI source sky distribution



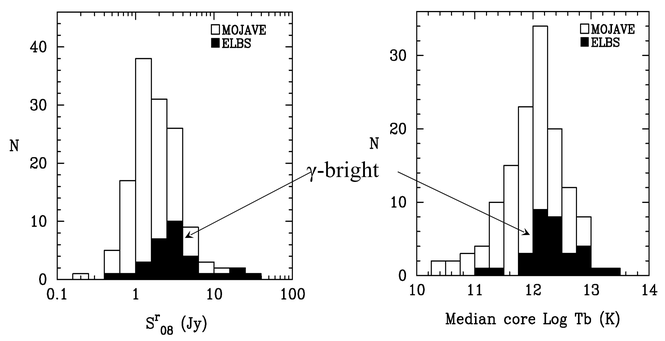
Cross-correlation of the *Fermi* LAT 3-month catalog with a VLBI catalog resulted in >95%-confidence identifications of 103 objects. Results of Abdo et al. (2009) associations are confirmed. Six new identifications are found, all within 10 deg from the Galactic plane.
VLBI provides a very efficient tool to identify bright γ-ray detections which have poor positional accuracy. It is suggested that this method be incorporated into the process of identification of the *Fermi* LAT catalogs and for estimation of systematics in γ-ray positions.

Direct correlation of simultaneous γ-ray and radio fluxes



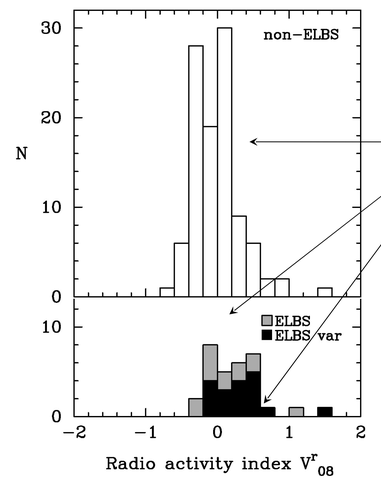
A positive correlation between *Fermi* LAT γ-ray photon flux and the quasi-simultaneously measured compact radio flux density is found with a high level of statistical significance.

Parsec-scale radio flux density and core brightness temperature



Distributions of the γ-ray bright (LAT detected) and LAT non-detected objects is found to differ with 99% probability.
Mean flux density values for the two sub-samples differ by a coefficient of about two.

Activity state analysis for LAT 3-months data



Activity index in the radio band: $V=(S_{08}-S_{99\gamma})/S_{99\gamma}$.

- Non-*Fermi*: -0.01±0.03.
- *Fermi* LAT: 0.23±0.07.
- *Fermi* LAT variable: 0.31±0.09.

Kolmogorov-Smirnov test: Distributions are different, confidence about 99%.

It is found that flares in radio and γ-ray domain happen within a typical apparent time separation of several months or shorter.