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High energy emission component and population of gamma-ray emitting radio galaxies

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In this study, we systematically studied the X-ray to GeV gamma-ray spectra of 61 Fermi/LAT-detected radio galaxies. We found an anticorrelation between peak frequency and peak luminosity in the high-energy spectral component of radio galaxies, similar to blazars. With this sample, we also constructed a gamma-ray luminosity function (GLF) of gamma-ray-loud radio galaxies. We found it is a blazar-like GLF shapes, but the $\log N$-$\log S$ relation prefers models with more low-z radio galaxies. This indicates many low-z gamma-ray-loud radio galaxies. We further investigated the nature of gamma-ray-loud radio galaxies. Compared to radio or X-ray flux-limited radio galaxy samples, the gamma-ray selected sample tends to lack high radio power galaxies like FR-II radio galaxies. We also found that only $\sim$10\% of radio galaxies are GeV gamma-ray loud. X-ray spectra of GeV emitting radio galaxies are less absorbed in the soft band than that of radio galaxies not detected by Fermi/LAT. These suggest that radio galaxies detected by Fermi/LAT have a more aligned jet toward our line of sight.

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