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Exploring and Characterizing Radio-loud AGNs in Time Domain

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ABSTRACT

High cadence observations provide the desired resolution and scale to investigate highly compact accretion-powered sources that are otherwise inaccessible/unresolvable via imaging. Investigation and studies till date of these sources over different time scales and in different energy bands have led to claim of all being statistically similar irrespective of their physical attributes like accretor mass, size, and type. Temporally, they are characterized by a power-law power spectral density (PSD, $P_\nu \sim \nu^{-\alpha}$) and a linear relation between flux and the intrinsic variability (rms-flux relation) of the source. We present results of first such systematic investigation of radio-loud AGNs (blazars and radio-galaxy) at gamma-ray energies (Fermi-LAT: 0.1 – 300 GeV) over 7.5 years of data. The analysis results are similar to other accretion-powered sources with PSDs consistent with a flicker-noise spectra ($\alpha \sim 1$) as well as a linear rms-flux relation. However, emission in these sources being originated in the jet (blazars) is very different compared to the radio-quiet sources where it is believed to be mainly from the accretion disk. The results are also consistent with the statistical properties of the Solar X-ray emission. We will discuss the implications of results in the context of physical processes powering the emission in these sources (radio-loud).