

Active Galactic Nuclei and Blazars; An Open Window to the Very High Energy Universe

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Jetted Active Galactic Nuclei (AGN) are the most powerful astrophysical sources continuously emitting radiation along the entire electromagnetic spectrum, as probed from Radio up to TeV gamma-rays. An overview about AGNs will be shown, with focus to its particular family of Blazars.

Blazars are dominant in the extragalactic gamma-ray sky especially at very high energies (VHE, $E > 100$ GeV), which is starting to be probed with increasing sensitivity and resolution power. The upcoming generation of VHE observatories are driven by the many open questions still to address. Among them: The acceleration mechanism in jetted AGNs and its jet composition; The possibility of probing regions close to super massive black holes for tests of general relativity; The existence of a putative gamma-ray background and its unknown origin; The possible correlation of extreme gamma-ray sources with astroparticles like PeV neutrinos and ultra high energy cosmic rays; The transparency of the universe to VHE photons as a probe for axion-like particles; The use of VHE sources as a probe for the spectral energy distribution of the extragalactic background light (EBL) specially in infra-red;

In this vast context, observations made with the Fermi-LAT satellite along its ~ 9 years of operation had made available to the scientific community an unique all-sky database covering many decades in energy, from tens of MeV up to hundreds of GeVs.

Given the importance of jetted AGNs for VHE astrophysics, the search for new gamma-ray blazars is key to build a better description of the gamma-ray sky. In my current work, the Fermi-LAT database is used for an all-sky survey looking for signatures of new gamma-ray sources based on a multifrequency approach. Motivations and current status of this work will be discussed, showing results and the main insights they bring us.