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Active Galactic Nuclei Jets Probed by Very-Long-Baseline Interferometry

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Very-long-baseline interferometry (VLBI) probes compact regions at the hearts of active galactic nuclei at a submilliarcsecond resolution. This technique enables detailed studies to be made of the non-thermal emission in the innermost regions of relativistic plasma jets. The scope of VLBI studies becomes ever broader, reaching higher resolution with longer baselines (space VLBI) and at higher frequencies (millimetre wavelength VLBI), opening new horizons with high fidelity polarization imaging to study the magnetic field structure and Faraday rotation, and exploring ample synergies in astrometric studies provided by the first results coming from the GAIA mission. Over the past decade, the combination of VLBI observations and the multi-messenger approach have proven exceptionally successful, helping to understand the nature of non-thermal gamma-ray emission observed with the Fermi/LAT, providing valuable insight on the physics of relativistic X-ray iron lines in AGN, searching for the astrophysical sources of neutrinos detected by IceCube, and potentially expanding this type of studies to the search of electromagnetic counterparts of gravitational waves. I will summarize recent results from some of these topics.

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