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Some Recent Observational Constraints on the Magnetization and Energy Dissipation in AGN Jets

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In this talk I will briefly discuss some recent observational constraints on the magnetization of relativistic jets in AGN jets, and the related issue of the energy dissipation and acceleration of the jet particles to ultra-relativistic energies. I will focus predominantly on the structures beyond the jet formation site, i.e. on the large-scale portions of the outflows, the jet termination shocks, and the extended radio lobes. The observational constraints follow from the detailed analysis of the radio and X-ray data for the selected objects, in particular from imaging and spectral analysis of the quasar jets with the Chandra X-ray Observatory, as well as from the radio and gamma-ray population studies, in particular with the Fermi-LAT. Those results, when augmented by simple models of the jet evolution and MHD structure, seem to suggest that the jet magnetization at large scales is typically low, in a sense that the ratio of the total particle energy flux to the jet Poynting flux, is always less than unity. At the same time, however, the internal structure of the jets and lobes may be rather inhomogeneous, so that the magnetic pressure may still dominate over particle pressure for certain ranges of the jet radius, or for particular segments of the lobes. The implication for the energy dissipation and particle acceleration at the jet termination shocks, and within magnetic filaments of the lobes, are briefly summarized.

Author: STAWARZ, Łukasz (Astronomical Observatory, Jagiellonian University)

Presenter: STAWARZ, Łukasz (Astronomical Observatory, Jagiellonian University)

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