THE PROBLEM OF HIGH-ENERGY EMISSION FROM AGN

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The basic framework for radio-bright AGNs, which are also the only types of extragalactic sources known to emit a significant amount of high-energy radiation, is a relativistic jet with shocks embedded in it. Presumably, the most significant intrinsic properties of the source are then the absolute luminosity of the jet/shocks, the flow speed (the Lorentz factor) and the angle which the jet makes to the line of sight. The more detailed nature of the flow (accelerating/decelerating flow, turbulence, particle acceleration/reacceleration, magnetic field configuration, jet opening angle and curvature, duty cycle of the shock activity, etc.) as well as the jet surroundings (in particular, density of the ambient photon field) must also play a role.

The spectral energy distributions of radio-bright AGN, often called blazars, can be approximated by two parabolas. The first one is caused by synchrotron radiation from the jet and from the shocks, the second one by an inverse Compton radiation from the relativistic electrons in the jet, upscattering ambient photons into X-to-TeV energies.

Both theoretically and observationally, our understanding of the blazar emission remains rather poor. I discuss some new attempts to model the spectral energy distributions of blazars, focusing on correlations between various observed and intrinsic properties, and on the problems of the proposed theoretical models for the high-energy emission.