A Multi-wavelength study of X-ray jets in active galaxies

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To probe the high-energy origin of AGN jets, a series of analysis incorporating available X-ray jet data with a synthesis model are carried out, in which the model includes synchrotron radiation, synchrotron self-Compton emission (SSC), and inverse Compton scattering off CMB photons (IC/CMB) – the main radiation mechanisms of X-ray jets as current consensus suggests. It has been demonstrated that synchrotron-dominated and inverse-Compton-dominated jets can be separated into two groups by comparing broadband spectral indices; using the similar technique but with a more sophisticated analysis, we have further estimated the possible contributions respectively from the three mechanisms to the observed fluxes of our samples. Our analysis shows that the SSC mechanism is responsible for most optical emission while the IC/CMB model is the major X-ray contributor; subsequently, constraints on the Doppler boosting factors and magnetic fields of jets are derived from the contribution fractions of the three mechanisms. Moreover, with the constrained beaming factors, the de-projected distance of each sample is calculated and the nature of jet propagation is discussed. There is an interesting trend showing that the synchrotron emission declines out to 100 kpc away from the centers of AGN and incidentally most of the optical and X-ray emission produced by SSC appears significantly at around the same scale. This could be the first evidence to indicate the average transportation limit of high-energy emission from jets.