

Extreme physics at extreme baselines

Andrei Lobanov

It is widely accepted that the maximum brightness of cosmic synchrotron sources should be ultimately determined by energy losses due to inverse Compton scattering, thus limiting the effective (brightness) temperature of incoherent synchrotron radiation to about one trillion degrees. However, a number of recent measurements made with ground and space VLBI have indicated that cosmic synchrotron emitters may actually dramatically exceed this limit. The observed violations of the inverse Compton limit suggest that extreme physical conditions may be present in the innermost regions relativistic jets on scales below about 1000 gravitational radii. This may signal the presence of significantly non-stationary processes, exotic particle energy distributions, or exceptionally strong and ordered magnetic fields in the close vicinity of supermassive black holes. Recent results in this field and their potential impact on our understanding of physics of jets and black holes will be discussed.