

S26a Evidence of a Characteristic Time-Scale in the X-ray Light Curves of TeV Blazars

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We have studied the rapid X-ray variability of four extragalactic TeV sources, Mrk 421, Mrk 501, PKS 2155-304 and 1ES 2344+514. Analyzing the X-ray light curves obtained from *ASCA* and/or *RXTE* observations, we have investigated the variability in the time domain from 10^3 to 10^7 sec. The structure functions show a roll-over around 1 day, which can be interpreted as the typical time-scale of day-by-day flare events. On time-scales shorter than 1 day, variability is significantly suppressed, indicating a steep power spectrum density (PSD) of $f^{-2\sim-3}$. This is very different from other types of mass-accreting black-hole systems for which the short timescale variability is well characterized by a fractal, flickering noise ($f^{-1\sim-2}$). Importantly, the steep PSD index and the characteristic time-scale of day-by-day flares imply that the X-ray emitting site in the jet is of limited spatial extent; $D \simeq 10^{17-18}$ cm distant from the base of the jet, which corresponds to $\simeq 10^{2-4}$ Schwarzschild radii for $10^{7-9} M_{\odot}$ black-hole systems.