Time Variability of Emission and Electron Acceleration in Blazars

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Recent observations of blazars by X- and gamma-rays show that blazars exhibit a strong time variation. We use the synchrotron-self-Compton (SSC) model to simulate the time variation of radiation and electron energy spectra. We solve the kinetic equations of electrons and photons simultaneously, including a simple model of electron acceleration which mimics the shock acceleration; we assume that electrons are accelerated on a given timescale $t_{\rm acc}$ in an acceleration region. Electrons escaping from the acceleration region are *injected* into a cooling region where electrons emit radio through very high energy gamma-rays via SSC. We show the numerical results of time evolution of the energy spectra of electrons and photons, when low energy electrons ($\gamma \sim 2$) are supplied in the acceleration region and accelerated up to $\gamma \sim 10^7$. Then gamma-rays up to TeV are emitted as observed from Mrk 421 and Mrk 501, when the acceleration timescale is sufficiently short. This model will be used to analyze acceleration mechanisms in blazars with the observations of time variation. Flares are also simulated assuming that $t_{\rm acc}$ is reduced for a period of time, i.e., temporal strong acceleration of electrons. With this simulation we study the light curves at various energy bands, which enables us to interpret observed flares of X- and gamma-rays in terms of electron acceleration and SSC.