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Radiative models for rapid blazar flares

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Rapid flux variability over a large range of wavelengths is a well-known signature of emission from blazars, with variability time scales of the order of a few days and below frequently observed at high energies.
Different radiative models with varying degrees of complexity are being developed to either reproduce individual flare events or overall statistical behaviour, but a general picture of the physical origin of blazar flares is still missing.
In our team, we have carried out a systematic study of the expected shapes of multi-wavelength flares for a range of particle acceleration and re-acceleration scenarios to establish characteristic observable signatures, such as time delays between energy bands, asymmetries and plateaux.
We have also investigated a particular scenario where rapid variability is due to the expected variation in the external radiation field for an accelerated plasma blob, without variations in the particle injection or acceleration.
Both studies are using a time-dependent leptonic code based on a Fokker-Planck equation of the particle evolution.

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