



A unified model for orphan and multi-wavelength blazar flares

Aims:

orphan flare is a peculiar aspect of blazar flare, which occurs in a specific energy band without correlated variability in other bands. We propose a unified model for explaining orphan and multi-wavelength flares from blazars in a common framework.

Model:

The model assumes that the blazar emission during a flare consists of two components:

- (i) a quasi-stable component that arises from the superposition of numerous but comparatively weak dissipation zones along the jet, forming the background (low state) emission of the blazar
- (ii) a transient component, which is responsible for the sudden enhancement of the blazar flux, forming at a random distance along the jet by a strong energy dissipation event.

Conclusions:

- (i) The SEDs of different flaring states for both 3C 279 and PKS 2155-304 can be explained by our model.
- (ii) The ratio χ between the Compton dominance of the flaring zone and that of the jet's background emission determines the spectral feature of the blazar flare.
- (iii) The flare duration and the orphan flare rates expected in the model are consistent with orphan flare observations made to date.