Contribution ID: **56** Type: **Contributed Talk**

Photons' scattering in a relativistic plasma with velocity shear: generation of high energy power-law spectra

Friday 14 October 2022 09:45 (15 minutes)

High energy power law spectra is common to many astronomical objects. It is often assumed that such power laws are produced by energetic particles, obtaining a power law distribution by Fermi acceleration process.Here we present a novel mechanism of generating high-energy power-law shaped spectra by repeated photon scattering off velocity shear layers in relativistic jets. This mechanism does not invoke the existence of energetic particles. We show that for plausible parameters, the observed spectral shape of gamma-ray bursts is recovered. This mechanism is applicable to many different astronomical sources, and enables a unique tool to infer their inner structure.

Track

GRBs

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Session Classification: Parallel 12