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Flare echos from relaxation waves in perturbed relativistic jets

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Multi-wavelength flux variabilities observed in relativistic jets are most often attributed to the diffusive acceleration of a population of relativistic electrons on internal shocks. The shortest observed variability time scale changes over several orders of magnitude between the radio and X-ray band. We simulate relativistic jets with the SR-HD code AMRVAC. Non-thermal particle distributions are injected at standing and moving shocks. We follow the propagation of a moving shock wave that can interact with a structure of standing recollimation shocks in the jet. Synchrotron emission and radiative transfer are calculated in post-processing for given observation angles and frequencies, assuming a turbulent magnetic field. Our study shows the emergence of flare events over a large frequency range with varying time scales due to moving and standing shocks interactions. We highlight the additional emission signature from relaxation waves forming and propagating due to the jet relaxation. Emission from this region can dominate the flux or lead to a flare echo ». Impact on flare morphology by time delay effect will be discussed for observation angle close and equal to 90°.

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