HEDLA 2022
13th International Conference on High Energy Density Laboratory Astrophysics
hedla@tecnico.ulisboa.pt

Relaxation shocks in variable relativistic jets

MELIANI ZAKARIA[1,†], Fichet de Clairfontaine, Gaetan[1], Zech, Andreas[1]

[1] *Laboratoire Univers et ThÃlories, Observatoire de Paris, UniversitÃl PSL, UniversitÃl de Paris, CNRS, F-92190 Meudon, France*

[†] zakaria.meliani@obspm.fr

One of the main scenarios to account for the multi-wavelength flux variability observed in relativistic jets of active galactic nuclei (AGNs) is based on diffusive shock acceleration of a population of relativistic electrons on internal shocks of various origins. To understand the physical processes associated with the observed multi-wavelength emission maps and light curves, we investigate the physics of the shocks in AGN jet. We simulate variable relativistic jets using the magneto-hydrodynamic code MPI-AMRVAC and where a distribution of non-thermal electrons distributions are injected in shock regions. Synchrotron emission and radiative transfer are calculated in the post-processing code RIPTIDE for given observation angles and frequencies. With our scenario, we were able to explain the appearance of trailing components behind the leading injected variability. The latter destabilizes the jet, causing the emergence of oscillating standing shocks and relaxation shocks. Emissions from these regions can dominate the overall flux or lead to "flare echos" in the light curve. Another observational marker for the presence of relaxation shocks appears in time-distance plots of bright radio components of the jet *Fichet de Clairfontaine et al. 2022*.

References

[1] arXiv:2203.02765