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Modellling the synchrotron emission of RMHD AGN jet simulations with the PLUTO par- ticle module

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The spectral energy distribution of radio-loud AGN have a characteristic double bump structure, with emission at the lower wavelengths being dominated by synchrotron radiation from non-thermal electrons in relativistic jets. To investigate how the radio emission of these sources relate to the dynamical structure of the relativistic jets we model the synchrotron emission by using 3D hybrid particle relativistic magneto- hydrodynamic simulations. The simulations were run using the grid based hydrodynamic code PLUTO. The model set up for the simulation consisted of a stratified background medium with less dense jet material injected, at a constant rate, with a Lorentz factor of 10. To model the synchrotron emission a sample of Lagrangian particles are continuously injected with the jet fluid using the particle hybrid module of the PLUTO code. Each Lagrangian particle represent a distribution of non-thermal electrons, with a power-law energy distribution that is updated with time. Processes such as adiabatic expansion and radiative cooling are taken into account when updating the particle distribution. By using the spectral information of the particles their synchrotron emissivity and absorption is calculated. These coefficients are integrated along a line of sight using ray tracing to reproduce intensity maps of the simulations at different radio frequencies.

Abstract field

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