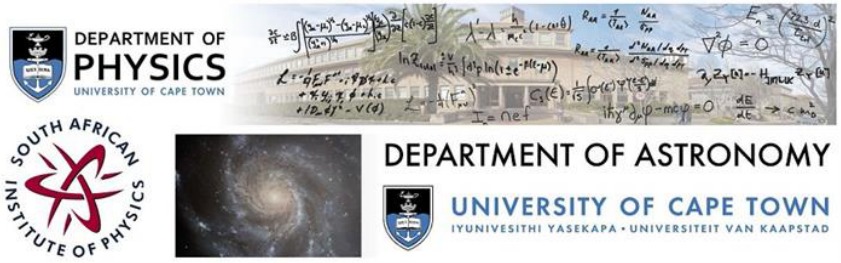

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Emission modelling of numerical hydrodynamical simulations with application to Active Galactic Nuclei jets

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Abstract content
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Active Galactic Nuclei, such as quasars and blazars, are highly variable over intra-day to year time scales. The regions that produce this variability have been the topic of many recent studies, especially in the investigation of correlation between multi-wavelength components from radio to gamma-rays. In this study a simulation is presented of an idealistic relativistic hydrodynamical jet propagating through a uniform background medium. This simulation is created with the use of the numerical code PLUTO ver 4.2 which uses high resolution shock capturing algorithms to evolve the fluid dynamic partial differential equations with time. In order to investigate possible causes of variable emission in the simulation a post processing emission code is developed to compute intensity maps of the hydrodynamic computational environment. The code is designed to model the synchrotron self-absorption spectrum in the radio regime for each cell. This emission is calculated using the emission and absorption coefficients, which are then integrated along a fixed line of sight to produce simulated intensity maps of the relativistic jet. Using the intensity maps we can investigate regions of variable emission as well as the respective time scales on which they occur. In this paper we present the initial results and intensity maps produced by the emission code as well as the planned future development of the project. The tools which are being developed for this hydrodynamic model can be applied to a range of other transient sources, such as X-ray and γ-ray binaries, to investigate the different emission components produced by such sources.

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