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# Parameter study of a semi-analytical relativistic MHD jet model in comparison with recent VLBI observations

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Jets are a largely common phenomenon and reveal themselves at different scales and redshifts, showing an extreme diversity in energetics, shapes and emission, in objects such as active galactic nuclei (AGN) and X-ray binaries (XRBs), as well as young stellar objects (YSOs) and gamma-ray bursts (GRBs).
Observations suggest that jets are an energetically important component, not only to the systems that host them, but also their larger surrounding environments, where they deposit a significant amount of energy that has been extracted from the accretion flow.
Therefore, understanding the mechanisms responsible for the formation and emission of jets is a fundamental problem to be addressed.
In this talk, I will present a new integration scheme to solve relativistic MHD equations describing collimated, relativistic outflows.
For the first time, jet solutions can be reconstructed from the disk mid-plane to downstream of the modified magnetosonic fast point, where there are hints of a recollimation shock.
These solutions show a range of jet dynamics (jet Lorentz factor ~ 1-10) and geometric properties (i.e. shock height ~ 10^3 - 10^8 Rg), which makes our model suitable for application to many different systems in which relativistic jets are launched. High-resolution multiband VLBI observations provide unprecedented details of the jet structure, constraining the jet geometry and, therefore, its dynamical properties, from the base up to the shock region.