Contribution ID: **104** Type: **Poster**

General relativistic hydrodynamic simulations of perturbed transonic accretion

Wednesday, 17 May 2023 13:15 (1 minute)

Comparison of horizon-scale observations of Sgr A*and M87* with numerical simulations has provided considerable insight in their interpretation. Most of these simulations are variations of the same physical scenario consisting of a rotation-supported torus seeded with poloidal magnetic fields. This setup has several well known limitations, most notably, it differs in important ways from what observed in simulations of accretion from large scales. We aim to study the flow patterns that arise at horizon scales in more general scenarios, that have a clearer connection with the large scale flow and are at the same time controlled by a reduced set of parameters. As a first step in this direction, we perform three dimensional general relativistic hydrodynamic simulations of rotating transonic flows with velocity perturbations injected from a spherical boundary located 1000 gravitational radii away from the central object. We study the general properties of these flows by varying angular momentum and perturbation amplitudes. We observe a rich phenomenology in accretion patterns, that includes smooth Bondi-like flows, turbulent torus-like structures, shocks, filaments, and complex sonic structures. For sufficiently large perturbations and angular momentum, our models show evidence of entropy generation and angular momentum redistribution not mediated by magnetic fields. Fluctuations are amplified and extend further in frequency than the injected white noise spectrum, producing a red noise spectrum for synthetic Bremsstrahlung light curves. Future inclusion of magnetic fields and radiative cooling could make this type of simulations a viable alternative for numerical modeling of general low-luminosity active galactic nuclei.

Primary authors: OLIVARES, Hector (Radboud University); Dr MOSCIBRODZKA, Monika (Radboud University); PORTH, Oliver (University of Amsterdam)

Presenter: OLIVARES, Hector (Radboud University)

Session Classification: Poster Prizes & closing