Mewes, Vassilios; **Montero, Pedro J.**; **Stergioulas, Nikolaos**; **Galeazzi, Filippo**; **Font, José A.**
General Relativistic simulations of accretion disks around tilted Kerr black holes. (English)
Zbl 1329.85006

Summary: We simulate the dynamics of self-gravitating accretion disks around tilted Kerr black holes (BH) in full 3D general relativity. For this purpose we employ the EinsteinToolkit, using the thorn McLachlan for the evolution of the spacetime via the BSSN formalism of the Einstein equations and the thorn GRHydro for the evolution of the hydrodynamics, using a 3D Cartesian mesh with adaptive mesh refinement. We investigate the effects of the tilt angle between the disk angular momentum and BH spin vector on the dynamics of these systems as the disk evolves in the tilted spacetime. By evolving the spacetime and matter fields, we are able to observe how both BH and disk react and evolve in the tilted configuration. For the very light disk with a constant specific angular momentum profile that we study, we observe a significant change of the disk shape after a few orbits. This change is more pronounced the larger the initial inclination angle is.

For the entire collection see [Zbl 1305.85002].

MSC:

85A15	Galactic and stellar structure
83C15	Exact solutions to problems in general relativity and gravitational theory
83C55	Macroscopic interaction of the gravitational field with matter (hydrodynamics, etc.)
83C57	Black holes
85-08	Computational methods for problems pertaining to astronomy and astrophysics

Keywords:

general relativistic simulations of accretion; tilted Kerr black holes

Software:

Einstein Toolkit; GRHydro

Full Text: DOI

References:

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