

Beyond the Kerr Black Hole-Torus paradigm

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Developments in observing technology have produced the first event-horizon-scale images of accreting supermassive black holes. The interpretation of such observations relies on sizable libraries of synthetic data produced from general-relativistic magnetohydrodynamic (GRMHD) simulations. This approach has provided considerable insight into these systems, but also suffers from some limitations. In particular, most of the libraries consist of the same physical scenario: a Kerr black hole surrounded by a rotation-supported torus seeded with poloidal magnetic fields. Two limitations of this model are its lack of connection with the parsec-scale accretion flow, and the lack of models considering spacetime geometries different from Kerr black holes. In this talk, we will explore a selection of the literature on alternative models, both from the side of different spacetime geometries and from that of different accretion models. In particular, we will focus on how insights from stellar-wind-fed accretion simulations have been incorporated in GRMHD simulations, and on the importance of understanding the accretion process in the search for signatures of new fundamental physics.

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