

Self-gravitating tori around black holes

In this talk I will report about the recent progress in modeling self-gravitating tori (disks) around black holes. Special emphasis will be put on general-relativistic Keplerian rotation in self-gravitating gaseous tori and the interaction between the angular momentum of the torus and the spin of the black hole. I will mention possible estimates relating the mass, the angular momentum and the size of such systems. This part of the talk will be based on 3 recent works: J. Karkowski, W. Kulczycki, P. Mach, E. Malec, A. Odrzywołek, and M. Piróg, *Phys. Rev. D* 97, 104017 (2018); J. Karkowski, W. Kulczycki, P. Mach, E. Malec, A. Odrzywołek, and M. Piróg, *Phys. Rev. D* 97, 104034 (2018); W. Kulczycki, P. Mach, and E. Malec, *Phys. Rev. D* 99, 024004 (2019). If time permits, I will also discuss models of magnetized stationary tori rotating around black holes. We have constructed such models (together with J.A. Font, S. Gimeno-Soler, A. Odrzywołek, and M. Piróg) within the framework of the ideal general-relativistic magnetohydrodynamics, consistently taking into account the self-gravity of the torus.