Relativistic MHD Winds from Rotating Neutron Stars

N. Bucciantini (1), T.A. Thompson (2), J. Arons (1), E. Quataert (1), L. Del Zanna (3)

(1) Astronomy Department, UC Berkeley, (2) Department of Astrophysical Science, Princeton, (3) Dipartimento di Astronomia, Univ. di Firenze

We present the results of a series of numerical simulations of the dynamics of axisymmetric, general relativistic magnetohydrodynamics winds, in a regime typical of newly born proto-neutron stars. We consider both monopole and dipole magnetic field, and explore the parameter regime extending from low-magnetization, thermally driven wind to high-magnetization, Poynting flux dominated outflows. We derive mass, angular momentum and energy losses self consistently, subject to a finite thermal pressure at the surface and compare the results with the analytic expectations from the classical theory of pulsars and magnetized stellar wind. We discuss the spin-down properties and the energy distribution in the wind, and their implications both in the context of rotation-powered pulsar and GRB-magnetar association.