Relativistic MHD winds from rotating neutron stars

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ABSTRACT: We solve the time-dependent dynamics of axisymmetric, general relativistic MHD winds from rotating neutron stars. The mass loss rate is obtained self consistently as a solution of the MHD equations, subject to a finite thermal pressure at the stellar surface. Conditions are chosen to be representative of the neutrino driven phase in newly born magnetars, which have been considered as a possible engine for GRBs. We compute the angular momentum and energy losses as a function of σ and and compare them with the analytic expectation from the classical theory of pulsar winds. We observe the convergence to the force-free limits in the energy loss and we study the evolution of the closed zone for increasing magnetization. Results also show that the dipolar magnetic field and the presence of a close zone do not modify significantly the acceleration and collimation properties of the wind.