

Relativistic MHD simulations of pulsar wind nebulae

Niccolò Bucciantini¹, Luca Del Zanna², Elena Amato³

¹Astronomy Department, University of California at Berkeley

²Dipartimento di Astronomia, Università di Firenze

³INAF, Osservatorio Astrofisico di Arcetri

ABSTRACT: Recent developments in the application of numerical codes for relativistic MHD have shown that the “jet-torus” structure commonly found in many PWNe, naturally arises as a consequence of post shock collimation by hoop stresses. This suggests that the structure of the observed X-ray and optical features can be used as a probe for the pulsar wind properties. We present the results of a recent series of numerical simulations aimed at the study of how the post-shock features depend on the wind properties. We show that the formation of a X-ray emitting jet not only puts a limit on the value of the magnetization but also on the extent of a possible unmagnetized region in the equatorial plane. We also present some new results concerning polarization and spectral index suggesting that the observed post-shock spectral flattening in the Crab Nebula could be explained as due to relativistic boosting.