

Modeling young pulsar wind nebulae

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Pulsar Wind Nebulae are powered by the relativistic, magnetized and cold wind emanating from a rapidly rotating neutron star (the pulsar) that interacts with the ambient medium. They are visible as bright non-thermal sources at a very broad range of energies, from radio to gamma-rays, with a variety of different morphologies. Pulsar Wind Nebulae are perfect places where to look at for extreme processes, and their relevance goes beyond high-energy astrophysics: relativistic plasmas, magnetic dissipation, particle acceleration in unfavorable environments, massive injection of particles in the ambient and contribution to the cosmic rays spectrum.

Over the past two decades, the main tools for studying these sources have been relativistic magnetohydrodynamic numerical simulations, which can reproduce many of the properties observed in these fascinating systems, down to very fine details, shedding light on the nature of the pulsar outflow.

In this talk I will discuss the actual state of the art numerical models for pulsar wind nebulae, with a focus on newborn and young systems.

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