

Pulsars and pulsar wind nebulae: CR electrons and positrons

Brief introduction on Pulsars and Pulsar Wind Nebulae: why they are interesting.

Basic workings of the pulsar magnetosphere: how the magnetosphere is filled with (pair) plasma and how the pulsar's rotational energy is converted in the most relativistic outflow observed in Nature.

Open questions about the asymptotic state of the wind: terminal Lorentz factor, magnetization and mass-loading. Pulsar theory confronts the inference from PWN observations: pair multiplicity inferred from one-zone PWN models.

PWNe as pulsars' calorimeters. The MHD description of PWNe from 1D steady state models to axisymmetric time-dependent simulations. Jets and torii drawn by the anisotropic pulsar wind. Possible origins of variable high-energy emission.

Particle acceleration in PWNe: why Fermi I does not work, what are the viable alternatives, what are the implications for the pulsar wind.

The puzzle of the rising positron fraction discovered by PAMELA.
The possible contribution of pulsars and PWNe to solving this puzzle.