

Nonlinear Propagation of Low-Energy Cosmic Rays from Supernova Remnants

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The transport of Galactic cosmic rays (CRs) in the near-source environment is investigated. After release from the accelerator, large gradients in the CR density can trigger the resonant streaming instability, producing Alfvén waves. The scattering on the self-generated magnetic turbulence leads to efficient self-confinement of CRs. Various damping processes and their dependence on the phases of the interstellar medium have been modelled. For the first time we consider the interplay of the self-confinement with Coulomb and ionisation losses, which become important for CR energies of a GeV and below as tested by the Voyager probes. While TeV particles are no longer self-confined after a few tens of kyr, the transport of MeV and GeV particles is still inhibited after 1 Myr with significant implications for modelling of Galactic CRs.

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Cosmic rays

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