

Particle acceleration in colliding shocks and nonlinear reacceleration

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Although supernovae remnants can accelerate cosmic rays up to PeV energies, the origin of more energetic particles remains uncertain. In particular, standard diffusive shock acceleration in isolated shocks does not explain some features in the spectrum such as the so-called “knee” and “ankle”. Other acceleration mechanisms should therefore be considered. I describe the time-dependent acceleration of cosmic rays in two colliding shocks. These collisions may appear to be standard processes when supernovae interact with winds in compact stellar clusters. I show how this system can be solved semi-analytically in order to obtain the resulting spectrum of accelerated particles. Under certain conditions, the collision hardens the spectrum at high energies. I then show how nonlinear reacceleration can be solved when multiple shock acceleration takes place.

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Collaboration

other Collaboration

Subcategory

Theoretical Results

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