

# Time-dependent CR feedback on shocks

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Non-linear diffusive shock acceleration (NDSA) is believed to be the mechanism responsible for the acceleration of cosmic-rays in supernova remnants. But current steady-state models fail to reproduce spectral features observed in supernova remnants, like spectral breaks or soft spectra at the highest energies.

We present a fully time-dependent NDSA-model in which we simultaneously solve the transport equation for cosmic rays and the hydrodynamical equations for the thermal plasma in 1-D under the assumption of spherical symmetry.

We apply our model to remnants expanding in a uniform medium and show that the cosmic-ray gradient in downstream of the shock significantly can modify the downstream flow profile. This effect influences the evolution of the remnant as well as the compression ratio at the thermal sub-shock and thus the resulting particle spectra.

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