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Thermal-to-nonthermal element abundances in different Galactic environments

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The nonthermal source abundances of elements play a crucial role in the understanding of cosmic ray phenomena from a few GeV up to several tens of EeV. In this presentation a first systematic approach is shown that describes the change of the abundances from the thermal to the nonthermal state via diffusive shock acceleration by a temporally evolving shock. Hereby, not only time-dependent ionization states of elements contained in the ambient gas are considered, but also elements condensed on solid, charged dust grains which can be injected into the acceleration process as well. This generic parametrized model is then applied to the case of particle acceleration by supernova remnants in various ISM phases as well as Wolf-Rayet wind environments. The resulting predictions for low energy cosmic ray (LECR) source abundances are compared with the data obtained by various experiments revealing the importance of dust grains as well as the possible contribution of different ISM environments to the observed LECR flux.

Keywords

SNR; Element abundances; Particle acceleration; Low-energy CR composition

Collaboration

other Collaboration

Subcategory

Theoretical Results

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