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Spectrum of Cosmic Rays, produced in Supernova Remnants

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Abstract content

A nonlinear kinetic theory of cosmic ray (CR) acceleration in supernova remnants is employed to calculate CR spectra. The magnetic field in SNRs is assumed to be significantly amplified by the effectively accelerating nuclear CR component. It is shown that the calculated CR spectra agree in a satisfactory way with the existing measurements of the observed Galactic CR (GCR) spectrum up to an energy of 100 PeV. The power-law spectrum of protons extends up to 3 PeV with a subsequent exponential cutoff that gives a natural explanation for the observed knee in GCR spectrum. The maximum energy of accelerated nuclei is proportional to their charge number Z . Therefore the break in the GCR spectrum is the result of the contribution of progressively heavier species to the overall CR spectrum, so that at 100 PeV the CR spectrum is dominated by iron group nuclei.

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Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 2 (OG part 1), pages 109-112

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