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The dominance of secondary nuclei in the cosmic radiation and the modulation of the nuclear species at the injection of the galactic accelerator

Tuesday, August 4, 2015 4:00 PM (1 hour)

The cosmic-ray abundances are compared to those of the quiescent matter referred to as galactic or solar abundances. Cosmic-ray and Galactic abundances are normalized to Iron.
The comparison takes advantage of the recent data of the energy spectra of the cosmic nuclei in the interval 3×10^{10} - 5×10^{14} eV and the observation of a constant spectral index of 2.67 $\pm$ 0.05 . The ratio of cosmic-ray to galactic abundances conforms to a remarkable regularity (or rule): the odd nucleus has a greater ratio than the adjacent even nucleus for the 14 nuclear species in the range, $5 \leq Z \leq 28$ where Z is the atomic number of the nucleus. Since many decades this rule is explained by the production of secondary nuclei by spallation reactions of primary nuclei in the interstellar medium. From this regularity it is inferred that the mechanism accelerating cosmic rays (galactic accelerator) does not alter galactic abundances of primary cosmic nuclei within about an order of magnitude, relative to Iron in the range $5 \leq Z \leq 28$.
From similar empirical arguments it is argued that primary proton and primary Helium in cosmic rays are highly depleted at the injection stage of the galactic accelerator. The depletion of H and He cosmic nuclei relative to Iron amounts to suppression factors higher than 10^4 - 10^5 which outnumber those previously reported in the past and recent literature.

Collaboration

– not specified –

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153

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