

Ulysses HET Measurements of Electron-capture Secondary Isotopes: Testing the Role of Cosmic Ray Reacceleration

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Abstract

In recent publications, consistent cosmic ray Galactic confinement times have been reported from Ulysses HET measurements of ^{10}Be , ^{26}Al , ^{36}Cl and ^{54}Mn . The abundances of other secondary radio-isotopes, specifically electron-capture isotopes, are a crucial test of cosmic ray reacceleration. Reacceleration is implicit in interstellar shock acceleration models, but its significance for interstellar propagation is largely unknown. Electron-capture is suppressed during interstellar propagation. However, if cosmic rays experience significant reacceleration, nuclei will have spent time at lower energies where electron pick-up, and hence electron capture, is more likely than at higher energies. Thus, electron capture secondary isotopes would be less abundant (and their daughters, more abundant) than otherwise predicted. The abundance ratio of ^{49}V to ^{51}V is a particularly sensitive test of this effect. The latest Ulysses HET data is used to address this problem.