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Constraints on Galactic Cosmic-Ray Origins from Elemental and Isotopic Composition Measurements

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The most recent measurements by the Cosmic Ray Isotope Spectrometer (CRIS) aboard the Advanced Composition Explorer (ACE) satellite of ultra-heavy cosmic ray isotopic and elemental abundances will be presented. A range of isotope and element ratios, most importantly 22Ne/20Ne and 31Ga/32Ge show that the composition is consistent with source material that is a mix of ˜80% ISM (with Solar System abundances) and 20% outflow/ejecta from massive stars. In addition, our data show that the ordering of refractory and volatile elements with atomic mass is greatly improved when compared to an ˜80%/20% mix rather than pure ISM, that the refractory and volatile elements have similar slopes, and that refractory elements are preferentially accelerated by a factor of ˜4. We also discuss recent gamma-ray measurements and show the complementary nature of gamma- and cosmic-ray measurements. We conclude that these data are consistent with an OB association origin of GCRs.

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