

# Inference of the Local Interstellar Spectra of Cosmic-Ray Nuclei $Z \leq 28$ with the GALPROP–HELMOD Framework: Prediction Capability and Hints of Excesses

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Since its launch, the Alpha Magnetic Spectrometer-02 (AMS-02) has delivered outstanding quality measurements of the spectra of cosmic-ray (CR) species ( $p^\pm$ ,  $e^\pm$ ) and nuclei (H–Si, Fe), which resulted in a number of breakthroughs. Spectra of heavier low-abundance nuclei are not expected until later in the mission. Consequently, we exploited a “fraction” of HEAO-3-C2 data that match available AMS-02 measurements, together with Voyager 1 and ACE-CRIS data, to make predictions for the local interstellar spectra (LIS) of nuclei that are not yet released by AMS-02. The resulting H to Ni LIS, in the energy range from 1 MeV/n to 100–500 TeV/n, cover 8–9 orders of magnitude in energy. In this context, some peculiar excesses have been found, hinting at possible primary components. The observed excesses in Li, F, and Al appear to be consistent with the local Wolf-Rayet stars hypothesis, invoked to reproduce anomalous  $^{22}\text{Ne}/^{20}\text{Ne}$ ,  $^{12}\text{C}/^{16}\text{O}$ , and  $^{58}\text{Fe}/^{56}\text{Fe}$  ratios in CRs, while excess in primary Fe is likely connected with a past supernovae activity in the solar neighborhood.

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