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Cosmic rays from 1 GeV to 100 EeV due to star formation processes?

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Star formation processes are very important in the Universe. In particular, the formation of massive stars results in supernova explosions with subsequent acceleration of cosmic rays (CR) in supernova remnants (SNRs). We show that the currently-available elemental spectra of protons, Helium, CNO group nuclei, and Iron in the energy range from 40 GeV to 100–500 PeV are well described with two separate populations of Galactic SNRs. We propose a scenario where the extragalactic CR component is produced by a third distinct population of SNRs; these SNRs probably have sub-relativistic speeds of shock waves and/or are the remnants of powerful hypernovae. Then we discuss a possibility that these three SNR populations dominate the entire observable spectrum of CR protons and nuclei spanning from 1 GeV to 100 EeV. Some details are available in astro-ph/2606.02748 (submitted to MNRAS).

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