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r-Process Nucleosynthesis and Early Chemical Evolution

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Observations of elemental abundances in metal-poor stars in the Galactic halo and dwarf galaxies are used to shed light on the stellar sources for the elements (1) from Na to Zn, (2) from Sr to Ag, and (3) from Ba to U. The production of Sr, Y, and Zr in the neutrino-driven winds from nascent neutron stars provides a key insight into the diverse sources operating in the early universe. It is shown that a wide range of core-collapse supernovae associated with neutron star and black hole formation are required to account for the observations. A self-consistent framework to explain these data requires low-mass core-collapse supernovae to be the source for the r-process.

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