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IMF of the first enrichment sources and their contribution to galaxy evolution

First I will show the initial mass function (IMF) of the first enrichment sources obtained with our abundance fitting analysis. We compare the elemental abundance patterns of about 200 extremely metal-poor (EMP) stars to our nucleosynthesis yields of primordial supernovae. As a result, the IMF spans 13-100 Msun with a peak at 25 Msun with a large fraction of hypernovae. The majority of the primordial supernovae have ejected 0.01-0.1 Msun of 56Ni, leaving behind a compact remnant (either a neutron star or a black hole), with a mass in the range of ~1.5-5 Msun. The masses of the first stars responsible for the first metal enrichment are predominantly <40 Msun. This implies that the higher-mass first stars were either less abundant, directly collapsed into a black hole without ejecting heavy elements, or a supernova explosion of a higher-mass first star inhibits the formation of the next generation of low-mass stars at [Fe/H]<-3. I will then focus the stars fitted with 13M sun or 100 Msun models, which have relatively low alpha/Fe ratios, connecting super-luminous supernovae. Finally, I will predict galactic chemical evolution with these first supernovae, which can be tested with future observations with JWST.

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