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CEMP star formation from faint supernova explosions

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Large observation campaigns of metal-poor stars in Galactic halo and dwarf galaxies have revealed that there are stars with higher carbon abundance relative to the solar one ([C/Fe] > 0.7; carbon-enhanced metal-poor [CEMP] stars). It has been considered that long-lived or low-mass CEMP stars form through fragmentation of their parent clouds induced by gas cooling of carbon grains. Carbon grains can be supplied by faint supernovae (FSNe), where iron-rich inner layer of the ejecta falls back into the remnant and mainly carbon-rich gas is ejected. We numerically follow enrichment process of a minihalo (MH) which hosts a first primordial (Pop III) star exploding as a FSN. In a cosmological simulation with a simulation box size of 300 comoving kpc, a Pop III star forms in a MH with 10^6 $M_\odot$ at redshift 12. We then run three simulations in three cases with progenitor masses of $M_{\rm PopIII} = 13$, 50, and 80 $M_\odot$. The metal and dust abundances are consistently given by the nucleosynthesis and dust formation models of FSNe. In this talk we will present the metallicity range of enriched region and discuss the condition of cloud fragmentation induced by gas cooling owing to carbon dust grains.

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