

CEMP Stars as Probes of First-Star Nucleosynthesis, the IMF, and Galactic Assembly



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Connecting the first galaxies with ultra faint dwarfs in the Local Group

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We investigate the star formation histories and chemical evolution of isolated analogs of Local Group ultra-faint dwarf galaxies (UFDs) and gas-rich, low-mass dwarfs. We perform a suite of cosmological hydrodynamic zoom-in simulations to follow their evolution from the era of the first generation of stars down to $z = 0$. We confirm that reionization, combined with supernova (SN) feedback, is primarily responsible for the truncated star formation in UFDs.

In this talk, we will show the importance of Population III stars, with their intrinsically high Carbon yields and the external metal enrichment, in producing low-metallicity stars and carbon-enhanced metal-poor (CEMP) stars. We will also discuss whether the progenitors of local, gas-rich dwarf galaxies ($M_{\text{star}} \sim 10^6$ solar mass) could possibly be detected as Damped Lyman-alpha Absorbers (DLAs) over cosmic time. Specifically, since we explicitly consider the contribution of heavy element enrichment from the first stars to the build-up of metals in dwarf galaxies, we can test the scenario that very metal-poor DLAs could contain the unique signature of Pop III nucleosynthesis.

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