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Dwarf galaxy formation and enrichment during reionization

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JWST will uncover a vast population of low-luminosity galaxies at Cosmic Dawn that is responsible for most of reionization. We present predictions for this high-redshift population, using two suites of high-resolution cosmological simulations – the Renaissance Simulations and the Tempest Simulations – that sample different large-scale environments. The Tempest Simulations specifically focus on the progenitors of a Milky Way like galaxy. Using a sample of over 3,000 resolved galaxies along with the formation of 10,000 massive Population III stars, we show that the luminosity function flattens above a UV magnitude of -14 and that the faintest galaxies may be the ancestors of ultra-faint dwarfs. Metals from Population III supernova are the primary source of metals in a fraction of the most metal-poor galaxies. Star formation in low-luminosity galaxies is extremely bursty as the gas reservoir is easily disrupted by internal feedback, resulting in a large spread in galaxy relationships, such as the mass-metallicity, SFR-stellar mass, and stellar mass-halo mass relations. This inefficient star formation ultimately leads to high mass-to-light ratios, similar to local ultra-faint dwarfs, even at high redshifts.

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Talk/Poster

Talk

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