A window on first-stars models from studies of dwarf galaxies and galactic halo stars ()

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Dwarf galaxies dominate the local universe by number and are predicted to be even more dominant at early times, with many having large star formation rates per unit mass. The cosmological role of dwarf galaxies in the metal enrichment and the reionization of the universe is an important but unresolved problem at present. Nearby low-mass galaxies are much more accessible observationally for detailed study and may be local analogs of the types of galaxies that hosted the first-light sources relevant for reionization. I will share recent results on UV studies of the escaping radiation from nearby low-mass starforming galaxies, as well as the tantalizing similarities in element abundance patterns between local dwarf galaxies and the latest data compilations on extremely metal-poor stars in galactic halos. I will highlight trends of interest in a variety of individual elements at values of [Fe/H] between -7 and -3, including alpha-elements, elements originating mostly in intermediate-mass stars, lithium, titanium, and r-process elements. These trends constrain not only models of the first stars and their supernovae, but provide a window into the physical conditions in early galaxies and when metal-free star formation may have ceased in the early universe.This work was supported by the University of San Francisco Faculty Development Fund, and NSF grant AST-1637339. We thank the Aspen Center for Physics, where some of this work was conducted, and which is supported by National Science Foundation grant PHY-1607611.

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