

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



Contribution ID: 27

Type: **Oral contribution**

Surviving Pristine Stars and the Implications of their Non-detection Paper Number

Tuesday 10 September 2019 17:30 (20 minutes)

As of now, the initial mass function (IMF) of metal-free stars is one of the key unsolved problems in the early Universe. Of particular interest is whether there are low-mass population III (Pop III) stars that survive until today. To determine how many such stars we should find in the Milky Way, we model Pop III star formation and feedback in the progenitors of Milky Way-like haloes. Assuming a typical top-heavy Pop III IMF that however still allows for such surviving stars, we find that about 4000 surviving metal-free stars should be present in the Milky Way. A simple estimate shows the incompatibility of this prediction with the lack of metal-free stars found during the search for extremely- and ultra-metal-poor stars. Thus, low-mass Pop III stars either have to be polluted by accretion during their life or form much more rarely than initially assumed. In the absence of pollution, constraints on the pristine IMF can be derived.

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Session Classification: THEORETICAL APPROACH TO CEMP STARS, FIRST STARS, AND FIRST GALAXIES