

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



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A new grid of Geneva stellar evolution models for Population-III stars

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Understanding the nature of the first stars and their explosive deaths is key to understanding the early universe and the evolution of high-redshift galaxies. With new facilities such as JWST we may soon have the first observations of the earliest stellar populations, but to understand these observations we will require detailed theoretical models. Using the Geneva stellar evolution code, we have developed a new grid of zero-metallicity models for a range of initial masses from 9 to 120 solar masses. We have produced three sets of models, one non-rotating, and two rotating at 20% and 40% of critical velocity. We analyse the evolution of the interior structure, energy generation, angular momentum transport, as well as the surface properties, identifying unique features of Population-III evolution. Key findings so far include the significant expansion of the stellar envelope at late evolutionary stages in rotating models, and the spin-up of very massive models leading to episodic mass-loss events at critical rotation. This research sheds new light on the behaviour of the first stars and how they may have impacted their environments, particularly in relation to their final fates.

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