

THE *BONNFIRE*S SCHEME FOR POPULATION STUDIES OF CEMP STARS

S. Sengupta, R. G. Izzard and H. H. B. Lau

Argelander-Institut für Astronomie, Auf dem Hügel 71, 53121 Bonn, Germany

BONNFIREs - a state-of-the art binary population synthesis code is ideal for modeling the chemically peculiar class of carbon enhanced metal poor (CEMP) stars that constitute a significant fraction (upto ~30%) of the oldest stars in our Galaxy. Using interpolated grids of low-mass stellar models (made using the MESA code) computed upto the tip of the giant-branch, BONNFIREs is designed to implement various mixing processes such as thermohaline mixing, gravitational settling, radiative levitation etc. together with nuclear processing of carbon-rich material accreted by a main-sequence secondary star from its binary companion that evolved through an AGB phase.

Our calculations predict the surface abundances of AGB-polluted CEMP stars depending on their evolutionary status (dwarf/giant), the composition and amount of accreted material along with binary properties of the progenitor system. Such predictions will be directly comparable with existing observations (e.g SDSS/SAGA database) as well as data from missions like GAIA and improve our current understanding of nucleosynthesis in the first generation of stars and their role in chemical evolution of our Galaxy.

[1] Lau, H.H.B., Izzard, R., & Schneider, F.R.N., *H.* 2013, *EAS Publications Series*, Vol. 64, 2013, pp.55-58.

[2] Lau, H.H.B., Izzard, R., & Schneider, F.R.N., *A&A* (in press)