Contribution ID: **60** Type: **Talk [Main Conference]**

A Novel Pre-supernova Pop III Stellar Evolution and Nucleosynthesis Scenario for the most Fe-deficient star (Keller star)

Wednesday, 8 February 2017 14:00 (15 minutes)

H-ingestion events in low metallicity and Pop III stars have been reported previously, but have not yet been investigated in any detail. In order to explain the most iron-poor star found to date, the Keller star (SMSS J031300.362670839.3), we propose a scenario based on stellar evolution simulations in which a 45Msun Pop III star experiences H-ingestion into the convective He-shell burning shell. During the H-ingestion stellar evolution models predict an energy release of log(Lnuc) = 12.8, or >10% of the mixed layer's internal energy. event the dynamic response of the convection zone must be ultimately investigated with 3D hydrodynamical simulations, which is a future goal. In the meantime, we follow a likely nucleosynthesis scenario associated with H-ingestion events using the NuGrid single-zone nucleosynthesis code PPN. The H-ingestion triggers light-element i-process nucleosynthesis on C12 as a seed. The assumption that the i-process enriched layer is partially ejected and diluted with unprocessed envelope material at a ratio of approximately 1:100 results in an abundance distributions that unmistakably reproduce that of of the Keller star, and suggest possible implications for the early chemical enrichment. Remaining discrepancies of our scenario prediction and observations can originate in the approximate nature of the astrophysics modeling, or in uncertainties of nuclear physics of the many unstable species involved in the reaction path.

Primary author: Ms CLARKSON, Ondrea (University of Victoria)

Co-author: Prof. HERWIG, Falk (University of Victoria)

Presenter: Ms CLARKSON, Ondrea (University of Victoria)

Session Classification: Session 7

Track Classification: Contributed talk