

Revealing the rise of the elements in the early universe with an integrated computational multi-physics approach

The anomalous abundances that can be found in the most metal-poor stars reflect the evidently large diversity of nuclear production sites in stars and stellar explosions, and the cosmological conditions of their formation. Significant progress in our predictive understanding of nuclear production in the early universe is finally made through advancing capabilities to perform large-scale 3D stellar hydrodynamic simulations of the violent outbursts of advanced nuclear burning. When complemented with comprehensive nucleosynthesis simulations we can characterize the chemical evolution of stellar populations. These are the underpinnings to decipher the messages from the early universe hidden in the anomalous abundances of metal poor stars. However, to exploit the full potential the multiple layers and pillars of this research must be integrated by complex computational approaches.

All the best, Falk Herwig.