Universität Basel

Research Project

Stars, Stellar Explosions, and the Origin of the Elements

Third-party funded project

Project title Stars, Stellar Explosions, and the Origin of the Elements
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The modeling of stellar evolution, stellar explosions, and the resulting nucleosynthesis (composition in wind or explosive ejecta) requires nuclear physics input like reaction rates, decay properties, and even fission predictions, when the heaviest elements are considered. Observations of stars and supernova explosions/ remnants provide clues for the quality of the modeling. The ejecta affect the evolution of the interstellar gas and thus the initial composition of stars at their formation. As the surface composition of old (unevolved) stars does not alter due to central burning, they mirror the “chemical” evolution of galaxies. Measuring the surface abundances of stars as a function of stellar “metallicity” (enrichment of heavy elements, measured via the Fe/H ratio) witnesses therefore the history of the gas composition in the Galaxy. This provides clues to the ejected abundances throughout galactic history, which in turn, reflect the physical conditions in the contributing sources and are therefore a testing tool for fundamental questions related to theoretical stellar and explosion models.

Keywords nuclear reactions and nuclei far from stability, core collapse and thermonuclear supernovae, hydrostatic and explosive nucleosynthesis, chemical evolution of galaxies
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