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# What Masses Can Teach Us About Stellar Evolution

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The origin of elements from iron to uranium is considered to be one of the 11 greatest unanswered questions in physics published by the magazine Discover. Today, the rapid neutron-capture process of stellar nucleosynthesis is held responsible for their production. Although more sophisticated astrophysical models for the r-process have evolved in recent years, the astrophysical conditions for a successful r-process have not been identified yet, and r-process model predictions still suffer from large uncertainties.
An alternative theory is the process of neutronization occurring in the high-density crust of neutron stars, which shifts the valley of stability towards neutron-rich nuclei. Thus, exotic rare isotopes become so-called equilibrium nuclei and can contribute to the elemental abundance. In both cases, precise mass values are important input parameters to constrain models of stellar element composition and to test their predictive power in comparison with observations. Whenever masses are not (yet) available, mass models are used to deliver required masses of nuclei participating in the astrophysical creation process. A third mechanism of stellar nucleosynthesis is the rp-process, rapid proton-capture process, which takes place on the proton-rich side of the valley of stability and originates in x-ray bursts.
In this contribution, recent mass measurements in the context of stellar nucleosynthesis are presented and possible measurements at future facilities will be discussed.

**Primary author:** KREIM, Susanne (CERN, Geneva, Switzerland and Max Planck Institute for Nuclear Physics, Heidelberg, Germany)

**Presenter:** KREIM, Susanne (CERN, Geneva, Switzerland and Max Planck Institute for Nuclear Physics, Heidelberg, Germany)

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