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Multi-d core collapse nucleosynthesis: the effect of different reaction rate libraries

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The explosion of massive stars as core-collapse supernovae represents one of the outstanding problems in modern astrophysics. Core-collapse supernovae figure prominently in the chemical evolution of galaxies as the dominant producers of elements between oxygen and the iron group, and they play an important role in the production of elements heavier than Fe. They represent a key ingredient in understanding the history of chemical enrichment of the Universe.

We present in this work a detailed analysis of nucleosynthesis calculations of a 15 $M_{\odot}$ neutrino-driven supernova explosions in 3D (explosions, approximative neutrino treatment, progenitors are presented by Wongwathanarat et al. 2017). Nucleosynthesis calculations are performed in a post-process using tracer particles method (TONiC code, Travaglio et al. 2011). The nucleosynthesis network used is based on 1500 isotopes, and for the first time about 500.000 tracer particles cover the star up to the explosive C-burning shell.

A detailed analysis on consequences using different nuclear reaction networks (theoretical as well as experimental ones). The nuclear processes included are electron captures, neutron captures, alpha captures and photodisintegrations.

The same comparison has been performed using 3D as well as 1D models (where also the 1D model includes neutrino-driven explosion) and will be discussed in this poster.

Expertises in stellar/hydrodynamic treatment of the explosion, explosive nucleosynthesis, nuclear rate from the theoretical as well as from the experimental point of view are included in this group of authors making this work possible and very much detailed.

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