Nucleosynthesis in Type Ia Supernovae

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In addition to various sources such as winds from massive stars the Universe is enriched with metals via supernova explosions. Yields from simulations of these events can then be used as an input for galactic chemical evolution calculations. In turn, the outcome of galactic chemical evolution simulations and observations of abundances can also be used to constrain the source of a particular element to a certain explosion scenario. To provide the necessary yields for these studies, detailed numerical simulations of supernova explosions including studies of their nucleosynthesis results have to be carried out.

We therefore present the nucleosynthesis yields of a variety of Type Ia supernova explosion models taken from the *HESMA* [1] archive. Our analysis contains pure deflagrations of Chandrasekhar mass white dwarfs (WDs), pure detonations of sub-Chandrasekhar mass WDs, the violent merger of two WDs and double detonations models including the detonation of a helium shell of top of the WD. We put special emphasis on the nucleosynthetic yields from the α-rich freezeout and the normal freezeout regime. The identification of particular elements characteristic for one those burning regimes in combination with predictions from galactic chemical evolution can then put constraints on the progenitor as well as the actual explosion mechanism of Type Ia supernovae.

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[1] Kromer, M and Ohlmann, S and Röpke, FK, Simulating the observed diversity of Type Ia supernovae, (2017).