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Rare nuclei production in core-collapse supernovae: the γ -process nucleosynthesis

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Neutron-capture processes made most of the abundances of heavy elements in the Solar System, however they cannot produce a number of rare neutron deficient stable isotopes (p-nuclei) lying on the left side of the valley of stability. The γ -process is recognised and generally accepted as a feasible process for the synthesis of p-nuclei in core-collapse supernovae. However this scenario still leaves some puzzling discrepancies between theory and observations.

My aim is to explore in more detail the p-nuclei production from massive stars in different sets of models and using the latest nuclear reaction rates. Here I will show some of the result of my analysis, by identifying several efficient γ -process sites and focusing on supernova progenitors that experience a C-O shell merger just before the collapse of the Fe core. I will also discuss how the γ -process depends on the supernova explosion energy and on the prescription used to calculate the core-collapse supernova.

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