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Role of light-mass nuclear reactions in the r-process nucleosynthesis, revisited

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We study the sensitivity of the r-process nucleosynthesis to the nuclear reactions of light nuclei. We first update nuclear reaction data in Libnucnet code if available in experiments. We then calculate the r-process nucleosynthesis in the core-collapse supernovae and collapsar. For core-collapse supernovae we consider two different scenarios: the magnetohydrodynamic (MHD) jet model and a simple exponential model for the weak r-process. We find important reactions such as $^{14}\text{C}(n, \gamma)^{15}\text{C}$ to which the r-process is sensitive. We finally discuss reaction network flows under the various conditions.

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