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Roles of fission, Neutron Star Mergers and Supernovae in R-Process Nucleosynthesis SHOTA SHIBAGAKI, University of Tokyo, TOSHITAKA KAJINO, National Astronomical Observatory of Japan, University of Tokyo, SATOSHI CHIBA, Tokyo Institute of Technology, GRANT MATHEWS, University of Notre Dame — The astrophysical site for the r-process has not yet been uniquely identified. Neutron star mergers (NSMs) have recently received special attention as production sites for the r-process. The ejected matter from the NSMs is extremely neutron-rich (Ye<0.1) and the r-process path proceeds along the neutron drip line and enters the region of fissile nuclei. In this situation, theoretical models of nuclear masses and fission are important. In this study, we carry out r-process nucleosynthesis simulations in the NSMs. We constructed a nuclear reaction network code by setting new models of nuclear masses and fission. Our result shows that the final r-process elemental abundances exhibit flat pattern for A=90-180 due to several fission cycling in extremely neutron-rich conditions of the NSMs. Combining these results with magnetorotaionally driven core-collapse supernovae (CCSNe) that predict successful r-process abundance peaks at A $\sim$ 130 and 195, we find that the NSMs can resolve the underproduction problems of such CCSN model prediction for the elements just below and above the abundance peaks. We discuss relative contribution to the solar-system r-process yields from CCSNe and NSMs.

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