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Distinguishing early-time and late-time effects of neutron capture rates in r-process nucleosynthesis simulations SEAN COLLISON, CHRISTOPHER ALLEN, ANA MIKLER, REBECCA SURMAN, Union College — Simulations of r-process nucleosynthesis need neutron capture rates for thousands of nuclei far from stability. We performed r-process nuclear network simulations with the aim to determine the most important neutron capture rates for further examination. We started with a baseline simulation then altered the neutron capture rate of each isotope and repeated the simulation for every nucleus in the network. By comparing these abundance patterns with the baseline, we were able to determine the nuclei whose neutron capture rates have the greatest effect on the final abundance pattern. Previous studies have shown two ways that neutron capture rates can influence the r-process pattern: an early-time photodissociation effect and a late-time neutron capture effect. For each important nucleus, we determined the mechanism that was causing the discrepancy, either neutron capture or photodissociation.

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