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Nuclear reaction rates and their influence on nucleosynthesis in the neutrino-p-process DANIEL HATCHER, Appalachian State University, CARLA FROHLICH, North Carolina State University, GEORGIOS PERDIKAKIS, Central Michigan University — The synthesis of elements heavier than iron in the early stages of galactic evolution is commonly attributed to Type II (core collapse) supernova explosions. However, the currently accepted mechanisms of heavy element synthesis through neutron capture processes (r-process and s-process) cannot explain the abundance patterns seen in very old galactic halo stars. A proposed solution to this problem is the neutrino-p-process, which takes place in the strong neutrino winds of core-collapse supernovae. In the neutrino-p-process, antineutrinos absorbed by protons yield neutrons that are quickly captured by the surrounding, proton-rich nuclei through (n,p) reactions. Such interactions allow for the nucleosynthesis of elements with atomic mass numbers greater than 64 (this includes Sr, Y, Zr and others possibly up to Sn). We study the sensitivity of the νp-process abundance pattern to (n,p), (p,γ), and (n,γ) rates for nuclei between Ni and Sn. We illustrate our findings for three different initial electron fractions and two representative trajectories. We discuss how these rates influence the abundance pattern and the nuclear flow. We observe the effects of predicted reaction rates on the abundance pattern and nuclear flow.

Daniel Hatcher
Appalachian State University

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