THE IMPACT OF NUCLEAR MASSES NEAR CLOSED SHELLS ON *R*-PROCESS ABUNDANCES

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Nuclear masses are one of the key ingredients of nuclear physics that go into astrophysical simulations of the *r* process. Nuclear masses effect *r*-process abundances by entering into calculations of Q-values, neutron capture rates, photo-dissociation rates, beta-decay rates and the probability to emit neutrons. Most of the thousands of short-lived neutron-rich nuclei which are believed to participate in the *r* process lack any experimental verification, thus the identification of the most influential nuclei is of paramount importance. We have conducted mass sensitivity studies near closed shells in the context of a main *r*-process. Our studies take into account how an uncertainty in a single nuclear mass propagates to influence the relevant quantities of neighboring nuclei and finally to *r*-process abundances. Using various nuclear models and astrophysical conditions we identify key nuclei in these studies whose mass has a substantial impact on final *r*-process abundances and discuss implications for measurements at radioactive beam facilities.

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