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ABSTRACT

A systematic study of Sr isotopes using the β-Oslo Method

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Our understanding of neutron-induced reactions on nuclei far from stability has far-reaching implications for cosmogenic nucleosynthesis and fundamental nuclear physics. Presently, direct measurement of the radiative-capture cross section is experimentally inaccessible for these short-lived nuclei; however, indirect methods such as the β-Oslo method enable the experimental constraint of key nuclear properties that are inputs for reaction-theory calculations. In particular, reaction rates on neutron-rich Sr isotopes directly influence astrophysical abundances through processes that produce the heaviest elements present in the universe. We have performed an experiment at CARIBU at ANL in order to determine the γ-ray strength function and nuclear level density for 93,94,95Sr isotopes. Low-energy Rb beams were transported to the Summing NaI(Tl) (SuN) detector where coincident β-γ events were measured. The γSF and NLD, properties extracted from the measured γ-ray spectra using the β-Oslo method, contribute the greatest uncertainty in Hauser-Feshbach calculations of neutron-capture reaction rates for short-lived neutron-rich nuclei. The experimental techniques and preliminary results of this work will be presented. Furthermore, the results of this work will shed light on nuclear structure properties for Sr isotopes, leading to significantly improved predictive reaction modeling.

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