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(G*) Constraining the Neutron Capture Rate for 90Sr through beta-Decay into the Short-Lived 91Sr Nucleus

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The slow (s) and rapid (r) neutron capture processes have long been considered to produce nearly the entirety of elements above Fe. Under further scrutiny, when comparing expected s-process and r-process yields with spectroscopic data, inconsistencies in abundance arise in the Z=40 region. These differences are expected to be attributable to the intermediate (i) neutron capture process. Sensitivity studies have shown that the intermediate neutron-capture process follows reaction pathways through experimentally accessible neutron-rich nuclei, providing opportunities to constrain the neutron capture rates that define them. Of these exotic nuclei, ^{90}Sr provides a strong case in providing new information on i-process abundances.

I will discuss the β-Oslo analysis of ^{91}Sr to reduce uncertainties in the ^{90}Sr(n,γ)^{91}Sr reaction, measured via the β-decay of ^{91}Rb into ^{91}Sr with the SuN total absorption spectrometer at the NSCL in 2018. By simultaneously measuring both γ-ray and excitation energies, a coincidence matrix was produced to perform the Oslo analysis, providing experimental information on the Nuclear Level Density (NLD) and γ-ray Strength Functions (γSF), two critical components in limiting the uncertainty of the neutron capture cross section when it cannot be directly measured. This constrained uncertainty will allow us to better characterize the contribution of ^{90}Sr to the i process and make progress in explaining observed abundances in suspected i-process stellar environments.

Keyword-1

astrophysics

Keyword-2

neutron capture

Keyword-3

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