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Investigation of ^{60}Zn resonance states for X-ray burst light curve

Thursday, January 30, 2025 2:00 PM (40 minutes)

X-ray bursts are frequently observed thermonuclear explosion events in the universe. Understanding their light curves is crucial for unveiling the properties of neutron stars. The shape of the light curve is sensitive to various nuclear reaction rates. It has been shown that the $^{59}\text{Cu}(p,\gamma)^{60}\text{Zn}$ and $^{59}\text{Cu}(p,\alpha)^{56}\text{Ni}$ reaction rates have the most significant impact on the light curve. These reactions proceed via $^{59}\text{Cu}+p$ resonance states in ^{60}Zn , meaning that the spin-parity and decay branch ratios of these states must be determined. We measured the $^{58}\text{Ni}(^3\text{He},n)^{60}\text{Zn}$ reaction at RCNP and determined the spin-parity of three resonance states in ^{60}Zn above the proton decay threshold for the first time. In this presentation, we will discuss the methodology, results, and future plans for the experiment to measure the decay branch ratios.

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