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Use of ($^3\text{He},n$) Indirect Measurements to Study H and He burning reactions in Type-1 X-Ray Bursts

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The reaction rate of the $^{59}\text{Cu}(p,\gamma)^{60}\text{Zn}$ has been identified to have a significant impact on the light curve of X-ray bursts, controlling the reaction flow out of the Ni-Cu cycle impacting the late-time light curve. The $^{58}\text{Ni}(^3\text{He},n)^{60}\text{Zn}$ indirect measurement can be used to study the $^{59}\text{Cu}(p,\gamma)^{60}\text{Zn}$ reaction. We are using the neutron evaporation spectrum from $^{58}\text{Ni}(^3\text{He},n)^{60}\text{Zn}$ in order to extract the level density of ^{60}Zn and constrain the $^{59}\text{Cu}(p,\gamma)^{60}\text{Zn}$ reaction rate. To augment the ($^3\text{He},n$) technique for lower level-density compound nuclides, a silicon detector array is being developed for use in determining charged-particle decay branching ratios from discrete states. The present status of data analysis and detector development will be discussed, as well as the future plans.

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