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Opportunities for Isomer Studies for Astrophysics at FRIB

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The role of nuclear isomers in astrophysical nucleosynthesis is gaining increased attention, as reactions on ground and isomeric states are both potentially important for determining the reaction rates and flow within the reaction network. A particular case is the odd-odd $N=Z$ nuclides in the sd -shell, which play an important role in breakout from the CNO cycle in nova nucleosynthesis, affecting reaction flow, the nucleosynthesis endpoint, and final abundances impacting potential astronomical observables. Because many of these nuclides have low-lying spin isomers, and the difference in structure between their ground and isomeric states leads to a different set of proton resonances in each case, it is important to constrain reactions on both ground and isomeric states.

Developments in radioactive-beam experiments are opening such opportunities, via direct and indirect techniques. An overview of recent measurements will be presented, with a particular focus on a campaign of experiments using the ORRUBA silicon detector array. This will include the first measurement using a new technique for manipulating ground/isomer content in reaccelerated beams without affecting ion optics, applicable to future measurements at the nascent Facility for Rare Isotope Beams.

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