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Highly-converted and low-energy isomer searches and FRIB

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Isomeric nuclear states provide a window into the structure of the atomic nucleus and can serve as a first indicator of change in nuclear structure as a function of neutron and proton number. However, gaps in our understanding occur when we are unable to identify and characterize certain isomeric transitions such as those where the isomeric transition is at low energy or if the transition is highly converted. This difficulty becomes increasingly important to address as a progression is made to very exotic systems which are produced at low intensities. A program of isomer searches and characterizations has been developed at MSU that deposits a rare isotope into a position sensitive solid-state detector of either HPGe or CeBr₃. The γ decay of the rare isotope used to populate isomeric states and their subsequent deexcitation is observed with high efficiency. Ancillary arrays of HPGe and LaBr₃ are deployed around the decaying source to monitor coincident γ rays. Recent applications of the technique using neutron-rich rare isotopes will be presented and including E0 transitions and newly observed isomeric states in the mass 76 system. The continuation of the program at FRIB which has the potential to produce approximately 80% of all nuclei expected to exist below $Z=92$ will also be discussed.

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