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Concurrent Mass Measurement and Laser Spectroscopy for Unambiguous Isomeric State Assignment DANIEL LASCAR, CARLA BABCOCK, JACK HENDERSON, MATT PEARSON, TRIUMF — Recent work by the TITAN group at TRIUMF on isomeric state mass measurements of odd-A, neutron-rich cadmium nuclei has shown a disconnect between experiment and theory in ^{127g,m}Cd. The spin and parity assignments of the ground and isomeric states are assigned as $3/2^+$ and $11/2^-$, respectively, primarily via systematic arguments. Conversely, state of the art shell model and *ab initio* calculations show a reversal of the states, predicting a ground state of $11/2^-$ and a $3/2^+$ isomer. Penning Trap Mass Spectrometry (PTMS) can measure the energy separation between the ground state and the isomer without ambiguity but cannot, on its own, comment on the spin and parity. Collinear Laser Spectroscopy (CLS) experiments have been performed on ^{127}Cd and have elegantly demonstrated the existence of both $3/2^+$ and $11/2^-$ states. What CLS cannot do, on its own, is assign an ordering to those states. If, however, a PTMS and CLS experiment could be performed concurrently using identical beams from the same facility then there exists sufficient information shared between both experiments that a definitive assignment can be made. We present a concept for a new slate of measurements using existing experimental facilities simultaneously, with shared resources, to definitively assign spin and parity for ground and isomeric states in short-lived nuclei.

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