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Neutrino physics with cold atoms MELISSA JERKINS, University of Texas at Austin — Recent advances in atomic slowing and cooling are opening new avenues through which to explore neutrino properties. I will discuss several potential applications of these technologies to neutrino research, including new concepts for tritium β-decay and neutrino Mossbauer experiments. The absolute mass scale of the neutrino has long been probed through tritium β-decay, but these technically challenging experiments have so far been unable to detect the neutrino mass. By utilizing a slow, cold beam of tritium atoms to create the tritium source, one could detect both the helium ion and the β, which implies that the neutrino mass could be directly reconstructed. I will present simulation results and discuss the feasibility of both a three-body tritium β-decay experiment and a boundstate tritium β-decay experiment. I will also discuss preliminary explorations of a neutrino Mossbauer experiment in which advances in magnetic slowing of atoms allow trace detection of tritium created in recoilless reverse tritium beta decay. Observation of the Mossbauer effect with neutrinos would be an exciting first step toward tabletop neutrino oscillation experiments.

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