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Precision atomic mass measurement of Xe-136 in a Penning trap
ELIZABETH WINGFIELD, MATTHEW REDSHAW, JOSEPH MCDANIEL, EDMUND MYERS, Florida State University — A Penning trap is a device that traps charged particles using a uniform magnetic field and the electric field produced by several electrodes. An ion placed in a magnetic field revolves at the cyclotron frequency given by fc = $(1/2\pi)$(qB/m) where B is the magnetic field and q and m are the charge and mass of the ion, respectively. After allowing for the electric field one can measure the mass of an ion by comparing its cyclotron frequency to that of an ion of known mass [1]. In my talk I will describe a recent mass measurement of Xe-136. The mass of Xe-136 is important to experimentalists attempting to observe neutrinoless double-beta decay. A peak in the electron's total-energy spectrum corresponding to its Q-value identifies this decay. With the mass now known to 0.1 part-per-billion the limitation in the efficiency due to the uncertainty in the mass of Xe-136 is eliminated [2].

[1] W.Shi, M.Redshaw, and E.G. Myers, Phys. Rev. A **72**, 022510 (2005).
[2] M. Redshaw, E.Wingfield, J. McDaniel, E.G. Myers. Accepted to Phys Rev. Lett.

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