Trapped Atoms as a Cold Target for Recoil Ions Momentum Spectroscopy. * X. FLECHARD, H. NGUYEN, J. GU, E. WELLS, C.L. COCKE, and B.D. DePAOLA. J.R. Macdonald Laboratory, Department of Physics, Kansas State University, Manhattan, KS 66506-2604. – We have developed a Magneto-Optical-Trap apparatus to prepare a cold Rubidium target for atomic collisions. The cold and localized target is an ideal extension to the well-established COLTRIMS technique because the low temperature of the trapped atoms should yield increased resolution compared to the traditional supersonic gas jet. In addition, while alkalis cannot easily be used as cold gas jet targets, they are ideal for trapping in MOTs. Our initial system under study is low energy (1-5 keV) charge transfer collisions between singly charged alkali ions and trapped rubidium atoms. By employing a longitudinal extraction, we anticipate especially high-resolution measurements of the longitudinal (along the projectile beam) recoil momentum, which directly yield Q values for the collisions. * Supported by the Division of Chemical Sciences, Geosciences and Biosciences Divisions, Office of Basic Energy Sciences, Office of Science, U.S. Department of Energy.