Abstract Submitted
for the DNP13 Meeting of
The American Physical Society

Kinetic energy of shakeoff atomic electrons from ^{37}K β^+ decay[1]

J.A. BEHR, A. GORELOV, C. FARFAN, S. SMALE, K. OLCHANSKI, L. KURCHANANOV, TRIUMF, M. ANHOLM, U. British Columbia, R.S. BEHLING, B. FENKER, P.D. SHIDLING, M. MEHLMAN, D. MELCONIAN, Cyclotron Institute, Texas A&M U., D. ASHERY, Tel Aviv U., G. GWINNER, U. Manitoba, TRINAT COLLABORATION — We have measured the kinetic energies from 0 to 30 eV of atomic shakeoff electrons from the β^+ decay of ^{37}K. Despite much experimental and theoretical work on the distribution of final ion charge states, shakeoff electrons from β^- decay have only been measured with energies above 150 eV [Mitrokhovich, Nucl. Phys. Atom. Energy, 11 125 (2010)]. We use our magneto-optical trap's time-varying magnetic quadrupole field combined with a uniform electric field as a spectrometer. Our result has more 15 eV electrons than a model using the sudden approximation and hydrogenic wavefunctions [Levinger Phys. Rev. 90 11 (1958)]. The total energy carried away by electrons is, as expected, a negligible correction to superallowed Ft values. Understanding the energy of these low-energy electrons is important for their use in precision β decay to select events coming from trapped atoms and start time-of-flight for the recoil ions. Our results could provide a benchmark for shakeoff electron calculations used for biological radiation damage [Lee, Comp. Math. Meth in Medicine doi:10.1155/2012/651475].

[1]Support: NSERC, NRC through TRIUMF, DOE ER41747 ER40773, State of Texas, Israel Science Foundation

J.A. Behr
TRIUMF

Date submitted: 01 Jul 2013 Electronic form version 1.4