Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Magnetically trapped erbium and thulium: rapid spin relaxation
COLIN B. CONNOLLY, YAT SHAN AU, S. CHARLES DORET, Harvard University, WOLFGANG KETTERLE, Massachusetts Institute of Technology, JOHN M. DOYLE, Harvard University — Spin relaxation due to atom–atom collisions is measured for buffer-gas cooled and magnetically trapped erbium and thulium atoms at a temperature near 500 mK. The rate constants for Er–Er and Tm–Tm collisions are 3.0×10^{-10} and 1.1×10^{-10} cm^3 s^{-1}, respectively, 2–3 orders of magnitude larger than those observed for highly magnetic S-state atoms. This is strong evidence for an additional, dominant spin relaxation mechanism, electronic interaction anisotropy, in collisions between these "submerged-shell," $L \neq 0$ atoms. This result is in contrast to the dramatic suppression of electronic interaction anisotropy in collisions between these atoms and helium. The large spin relaxation rates observed here imply that evaporative cooling of these atoms in a magnetic trap will be highly inefficient.

Colin B. Connolly
Harvard University

Date submitted: 21 Jan 2010 Electronic form version 1.4