Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Collision-induced spin depolarization of alkali-metal atoms in cold ^{3}He gas T.V. TSCHERBUL, P. ZHANG, H.R. SADEGHPOUR, A. DALGARNO, N. BRAHMS, Y.S. AU, J.M. DOYLE, Harvard University — We report a combined experimental and theoretical study of spin exchange in collisions of the alkali metal atoms with ^{3}He in the presence of an external magnetic field. The lifetime of magnetically trapped ^{7}Li and ^{39}K atoms is measured, allowing for the extraction of lower bounds to the ratios of elastic and spin depolarization rates. We use accurate ab initio calculations to evaluate the Fermi contact interaction constants for Li, Na, K, and Rb atoms interacting with ^{3}He. The calculated spin exchange rates are in good agreement with the values measured in spin exchange optical pumping experiments. It is concluded that the alkali metal atoms in a buffer gas of ^{3}He have extremely small spin depolarization rates, suggesting a number of potential applications in precision spectroscopy and quantum optics. Phys. Rev. A **78**, 060703(R) (2008).

Timur Tscherbul
Harvard University

Date submitted: 22 Jan 2009 Electronic form version 1.4