Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Circular Dichroism of RbHe and RbN_2 Molecules[1] BRIAN LANCOR, University of Wisconsin-Madison, EARL BABCOCK, Juelich Center for Neutron Science, ROBERT WYLLIE, THAD WALKER, University of Wisconsin-Madison — Spin exchange optical pumping (SEOP) is a method for producing spin polarized ^{3}He through collisional transfer of angular momentum from an optically pumped Rb vapor. A long standing concern is that SEOP is much less efficient than theoretically predicted; it takes more laser power to polarize a given number of ^{3}He nuclei than expected. We have investigated the effect of Rb-He and Rb-N_2collisions on the quality of the dark state necessary for efficient optical pumping. N_2 and ^{3}He collisions break the angular momentum selection rules and make the dark state weakly absorbing. With direct transmission measurements of a probe beam propagating through highly polarized atoms, along with precise Rb spin polarization measurements, we have deduced the circular dichroism for Rb with ^{3}He and N_2buffer gasses. Simulations show that the molecular absorption of pump light by atoms in the nominally dark ground state accounts for a significant amount of the observed inefficiency, particularly with broadband pump sources.

[1]Supported by DOE.

Brian Lancor
University of Wisconsin-Madison

Date submitted: 25 Jan 2010 Electronic form version 1.4