

APR15-2015-020086

Abstract for an Invited Paper
for the APR15 Meeting of
the American Physical Society

Spin-Exchange Optical Pumping of He-3

THAD WALKER, Univ of Wisconsin-Madison

Spin-exchange optical pumping, in which angular momentum is transferred from light to alkali atoms to He-3, is a powerful method for producing large quantities of highly polarized nuclei for electron scattering experiments and neutron spin filters/analyzers. Technical innovations (exquisite aluminosilicate glass cells with $T_1 \gg 100$ hours, > 100 Watt frequency-narrowed diode lasers) and improved understanding of the atomic physics processes involved (precision polarimetry, hybrid spin-exchange, circular dichroism), have resulted in orders of magnitude scale-up from the nascent experiments in the late 1980s. Improved understanding of effects such as the X-factor and particulate formation are needed to further advance the conversion of spin-polarized light into seminal physics results.