

Abstract Submitted
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Spin-Polarizing ^3He at 8 atm with a frequency narrowed diode laser* C.W. ARNOLD, T.V. DANIELS, A.H. COUTURE, T.B. CLEGG, UNC and TUNL — In support of measurements of spin-correlation parameters in low-energy p + ^3He elastic scattering, we have been working to improve our polarizer systems [1]. Polarized ^3He gas is commonly produced by spin-exchange with optically pumped Rb vapor. It has been shown [2], [3] that a frequency narrowed diode laser array is a relatively inexpensive way to improve polarization. Thus, we have developed such a system which employs a nominal 50 W Quintessence 25-diode laser array. In non-narrowed mode, it operates at 790 to 795 nm with a linewidth of ~ 2 nm. We have seen up to 32 W output when this array is placed in an external optical cavity with a Littrow mounted grating to narrow the linewidth to ~ 0.3 nm. Using this system, we have achieved over 30% polarization in a degaussed Pyrex cell filled to 8 ATM with a 60:1 ratio of ^3He to N_2 . This represents a 20% improvement over values obtained with our former non-narrowed 60W Optopower laser system. The improvement is thought to arise from an increase spectral power placed into the Rb D1 absorption line, and a decrease in the amount of unwanted pumping on the D2 line. Spectra and operating conditions will be discussed. *Work supported by US DOE Grant No. DE-FG02-97ER41041 [1] T. Katabuchi et al, Rev. Sci. Instrum. 76, 033503, (2005) [2] I.A. Nelson et al, Appl Phys Lett., Vol 76 No. 11, 1356 (2000) [3] B.Chann et al, J. Appl. Phys. Vol 94, No. 10, 6980 (2003)

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