Abstract Submitted
for the HAW05 Meeting of
The American Physical Society

High percentage 3He polarizer using spectrally-narrowed external-cavity high power multi-array stack diode laser MICHAEL MASON, WILLIAM HERSMAN, University of New Hampshire — Parity-violating asymmetry experiments involving polarized slow neutrons, including the present NPDGamma experiment, require a large flux of polarized neutrons. Sources of neutrons from spallation targets moderated to cold temperatures provide a large amount of unpolarized slow neutrons. The unpolarized neutron beam can then be polarized by passing it through the polarized 3He cell, taking advantage of the greater attenuation of neutrons anti-aligned with the 3He than those that are aligned. The thickness of the up and down helium states determines the transmission of the down and up neutron states, and hence the transmitted neutron polarization and flux. Precision measurements of beta-decay asymmetries planned for the Spallation Neutron Source, including the abBA experiment, impose the additional requirement of small uncertainties in the neutron polarization. One way of accomplishing high precision in the neutron polarization is to force the neutron polarization close to unity by passing the neutron beam through many attenuation lengths of a thick polarized 3He spin-filter. The simultaneous requirements of high polarization, low uncertainty, and high flux demand the highest 3He polarization attainable. This can be accomplished with large volume cells by using our newly developed spectrally-narrowed external-cavity high power multi-array stack diode laser.

Michael Mason
University of New Hampshire

Date submitted: 15 Jun 2005 Electronic form version 1.4