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A Novel Optics Design for Laser Polarized ^3He Targets JAIDEEP SINGH, VLADIMIR V. NELYUBIN, SCOTT T. ROHRBAUGH, W. AL TOBIAS, GORDON D. CATES, University of Virginia — Laser polarized ^3He targets using spin-exchange optical pumping (SEOP) are used for studying nucleon spin structure and neutron form factors, among other things. Optical pumping requires several watts of laser light which is supplied by multiple fiber-coupled laser diode arrays. Traditionally, each of these lasers required its own set of optics to collimate and circularly polarize the beam. This resulted in several beam lines with large angular offsets from the central beam line which limit the efficiency of optical pumping. We present a compact design using just one set of optics which takes advantage of a 5 to 1 fiber optic combiner. Upto 5 lasers can be connected to a combiner which ultimately results in just two nearly parallel beam lines. Another advantage is the easily adjustable size of the beam spot on the target. This design has already been successfully implemented in our lab and in the Jefferson Lab Hall A polarized ^3He target. We also discuss an analysis of the design including a detailed optical pumping simulation used to motivate the design parameters.

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