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Laser System and Optical Cavity for the Hall C Compton Polarimeter[1] ERIC HOLLAND, HALL C COLLABORATION — At Jefferson Lab a polarized electron beam is used to study the properties of nuclei. Currently, in Hall C a Møller Polarimeter is used to measure the electron beam polarization. This process is accurate but measurements cannot be made simultaneously with the main experiment and this leads to the assumption that the polarization remains constant between measurements. To supplement the Møller Polarimeter, Hall C is constructing a Compton Polarimeter, which performs non-destructive electron beam polarization measurement by Compton scattering. The purpose of this research is to optimize the laser component of the Compton Polarimeter. A fiber optic pulsed laser, with the same radio frequency as the electron beam (499MHz), was chosen to improve the luminosity and thus the number of Compton events. The current choice of the laser alone would be adequate for Hall C; however, a higher power system would provide two obvious benefits: the time needed for a measurement would decrease, and the signal to background noise ratio would increase. An optical cavity was proposed to achieve a gain in the laser power. Due to cavity conditions and geometrical restraints, it was determined that a cavity of length 1.2 meters would satisfy the needs of the Compton Polarimeter best. Experimentally, an external cavity could not be coupled to the radio frequency non-mode locked pulsed laser.

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