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Reducing DAC noise to sub-millivolt level in an effort to lock a high gain Fabry-Perot cavity LAWRENCE LEE, Rutgers University — Several pending experiments at JLAB Hall A require Compton polarimetry at a higher precision than currently obtainable in the hall, requiring $\sim 1\%$ error electron polarization measurements. As the frequency of light scattered from the electron beam is increased, the longitudinal asymmetry is decreased as understood within the framework of QED, lowering experimental error. The goal of the project is to create a cavity that resonates with more power and at a higher frequency than the currently implemented setup. Obtaining a PDH-locked, high gain Fabry-Perot cavity that resonates at 1.5 kW of green (532 nm) laser is desired. To combat mechanical fluctuations of the cavity at atomic scales, the feedback loop used tunes the frequency of the input laser. Many upgrades to our hardware and software are required to lock the cavity over long time periods. To this effect, a digital-to-analog converter upgrade was performed to implement a 16-bit DAC setup over the current 12-bit DACs to reduce the effect of bit-noise, which currently rivals the bandwidth of the high-gain cavity. The reduction of noise to a level well within the cavity's bandwidth should allow a more stable lock of the cavity.

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