DEVELOPMENT AND IMPLEMENTATION OF OPTICAL ISOLATION FOR A CONTINUOUS WAVE FABRY PEROT QUANTUM CASCADE LASER (CW-FP-QCL) AT 8.5$\mu$m USING AN EXPERIMENTAL FARADAY ROTATOR

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In continuous wave cavity ringdown spectroscopy, the precise alignment of a high finesse cavity can introduce disruptive optical feedback into the cw laser source from the cavity back-reflection. This optical feedback can destabilize the laser and significantly impair the mode-hop free tuning range. A general solution to this problem is to use a Faraday rotator in conjunction with a pair of polarizers to optically isolate the cw laser source. Unfortunately there are no commercially available Faraday rotators for use with mid-infrared lasers such as cw-FP-QCLs, which are capable of providing frequency coverage beyond standard difference frequency generation systems. The development of Faraday rotators in the mid-infrared is therefore essential for providing optical isolation for cw-FP-QCLs. We are developing and testing a Faraday rotator at 8.5 $\mu$m for use with a cw-FP-QCL laser system built in our laboratory. The end goal is to extend the mode-hop free tuning range of the cw-FP-QCL laser system to assist in the acquisition of high resolution spectra of a mid-infrared band of $C_{60}$. We will discuss the current progress in the development of an optical isolator to improve the mode-hop free tunability of our cw-FP-QCL system.