Accurate modeling of atmospheric trace gases requires detailed knowledge of spectroscopic line parameters at temperatures and pressures relevant to the atmospheric layers where the spectroscopic signatures form. Pressure-broadened line shapes, frequency shifts, and their temperature dependences, are critical spectroscopic parameters that limit the accuracy of state-of-the-art atmospheric remote sensing. In order to provide temperature dependent parameters from controlled laboratory experiments, a 20.946 ± 0.001 m long path Herriott cell and associated transfer optics were designed and fabricated at Connecticut College to operate in the near infrared using a Bruker 125 HR Fourier transform spectrometer. The cell body and gold coated mirrors are fabricated with Oxygen-Free High Conductivity (OFHC) copper. Transfer optics are throughput matched for entrance apertures smaller than 2 mm. A closed-cycle Helium refrigerator cools the cell and cryopumps the surrounding vacuum box. This new system and its transfer optics are fully evacuated to ~ 10 mTorr (similar to the pressure inside the interferometer). Over a period of several months, this system has maintained extremely good stability in recording spectra at gas sample temperatures between 75 and 250 K. The absorption path length and cell temperatures are validated using CO spectra. The characterization of the Herriott cell is described along with its performance and future applications.\textsuperscript{a,b}

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