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Cavity enhanced absorption spectroscopy of carbon dioxide using a DFB diode laser and a swept optical cavity

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Keywords

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Abstract

A compact DFB tunable diode laser operating around 1.572 μm was used to study the cavity enhanced absorption spectroscopy of carbon dioxide near 1.572 μm . It was experimentally demonstrated that a narrow-band continuous wave laser could be used in combination with a high -finesse optically stable cavity to perform highly sensitive direct absorption spectroscopy using ideas from the field of cavity ring down spectroscopy in a simple experimental setup. Laser radiation was coupled into optical cavity via accidental coincidences of laser frequency with one of multitude modes of the cavity. Absorption spectrum of carbon dioxide was obtained, the absorption signals were extracted from the measurement recording only the highest light intensity that leaked out of the optical cavity. A wavemeter was used to record accurate frequency of the laser. An absorption sensitivity of about $3.39 \times 10^{-7} \text{ cm}^{-1}$ has been achieved.

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