

Development of a mid-IR Cavity Ring-down Spectrometer for High-Precision Real-Time Continuous Monitoring of Multiple Trace Gases and Stable Isotopic Species in the Atmosphere

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This project will focus on the development and implementation of a new generation atmospheric chemical sensing technology for simultaneous detection, quantification and continuous monitoring of numerous atmospherically relevant key molecules in the Earth's atmosphere with unprecedented sensitivity and molecular specificity. We will exploit the cutting-edge mid-infrared quantum cascade laser technology combined with a state-of-the-art high-finesse optical cavity-enhanced absorption technique, termed cavity ring-down spectroscopy. The new development will also enable direct high-precision optical measurements of isotope ratios of many molecules at trace concentrations that can reveal important insights into atmospheric transport and exchange processes.