OPTICAL DETECTION AND QUANTIFICATION OF RADIOCARBON DIOXIDE ($^{14}CO_2$) AT AND BELOW AMBIENT LEVELS

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Due to their age, fossil fuels and their byproducts are almost entirely depleted in radiocarbon (^{14}C). As a result, measurements of radiocarbon provide a unique tracer for determining the origin of products and emissions. Recent efforts at NIST have applied mid-infrared cavity ring-down spectroscopy to measurements of radiocarbon dioxide to allow for more rapid and less expensive measurements than are possible with traditional techniques such as accelerator mass spectrometry. I will discuss our present measurement detection limits and precision as well as discuss limiting noise sources and plans to further improve the instrument's stability and reproducibility.