

THZ FABRY-PEROT SPECTROMETER

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The development of Cavity-Enhanced Techniques and Cavity Ring Down Spectroscopy has allowed many sensitive infrared measurements to be undertaken. We have constructed a THz resonator with a high finesse to form the basis of a new instrument for sensitive cavity enhanced THz measurements. The resonator uses a low loss oversized corrugated waveguide and high reflectivity photonic mirrors. An effective path length of one kilometer is obtained for a device that is 50 cm in length. A significant sensitivity improvement has been evaluated at 620 GHz by the measurement of minority isotopologues of OCS^a. The sensitivity achieved has allowed several centrifugal distortion-induced rotational lines of CF₄ to be recorded and its tetrahedral splitting to be resolved^b.

^aFrancis Hindle, Robin Bocquet, Anastasiia Pienkina, Arnaud Cuisset, and Gaël Mouret, Terahertz gas phase spectroscopy using a high finesse Fabry-Pérot cavity *Optica* (2019) vol 6, 1449-1454 DOI: 10.1364/OPTICA.6.001449

^bCuisset A, Hindle F, Mouret G, Bocquet R, Bruckhuisen J, Decker J, Pienkina A, Bray C, Fertein E, Boudon V. Terahertz Rotational Spectroscopy of Greenhouse Gases Using Long Interaction Path-Lengths *Applied Sciences* (2021) vol 11(3) p 1229. <https://doi.org/10.3390/app11031229>