A NEW, LOW TEMPERATURE LONG PATH CELL FOR MID-IR to THz SPECTROSCOPY WITH SYNCHROTRON RADIATION AT SOLEIL

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In this talk we will present the details and performances of a new cell, specially designed for accurate spectroscopic measurements in the 80 to 400K temperature range with variable path lengths from 3 to more than 140m as well as to accommodate the specific requirements of high resolution measurements in the mid-IR, as well as on the Far-Infrared (FIR) AILES beamline at SOLEIL. The spectral coverage at these temperatures ranges from the visible to less than 10 cm^{-1}, thanks to the use of diamond windows. The design of the cryostatic and vacuum set-up allows vibration-free operation. The equipment provides for temperature homogeneity and pressure control to better than 2 percent over the 100 to 400K and 0.1 to 1000 mbar ranges. Remote-controlled opto-mechanical systems enable in situ readjustements as well as changes of the optical path length within half an hour, in order to optimize measurement time in an open user facility. The design and performance of the equipment will be briefly presented and illustrated on spectroscopic examples. This new instrument opens up the way for many experiments in the field of high-resolution gas-phase IR spectroscopy, in particular in quantitative spectroscopy for atmospheric applications: measurements of absorption line parameters (absolute intensities and pressure-induced widths) using Fourier transform spectroscopy.