

## VIBRATIONAL BENDING MODES METROLOGY IN THE 670-720 CM<sup>-1</sup> RANGE

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We introduce a comb-referenced optical spectrometer operating in the long-wavelength (LW) part of the mid-infrared (MIR) region. It is based on an innovative laser source based on difference frequency generation between two MIR lasers, namely a cw DFB-QCL and a CO<sub>2</sub> laser, which produces widely tunable light from 12.1 to 14.8  $\mu\text{m}$  with optical power up to 110  $\mu\text{W}$  and MHz-level linewidth. We exploit it to give the first evidence of bending modes metrology in this region, with the assessment of several CO<sub>2</sub>-based frequency benchmarks with uncertainties down to 30 kHz, and the accurate study of the  $\nu_{11}$  band of benzene, which is a significant testbed for the resolution of the spectrometer. These results foster optical metrology in a region not explored so far and pave the way for accurate rotationally-resolved studies of the energy structure of large molecules, such as aromatic hydrocarbons.