A COMBINED SYNCHROTRON-BASED HIGH RESOLUTION FTIR AND DIODE LASER JET INFRARED SPECTROSCOPY STUDY OF THE CHIRAL MOLECULE CDBrClF

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The experimental detection of molecular parity violation[a] $\Delta_{PV}E$ is of great interest because of its importance in the understanding of fundamental aspects of molecular dynamics and symmetries. One possible method for this is measuring rovibrational or rotational frequency shifts in the infrared or microwave spectra of enantiomers[b]. For that reason we have measured and analysed the rotationally resolved infrared spectrum of CDBrClF as a prototype spectrum for a chiral molecule using three different techniques. The spectrum has been recorded at room temperature with the Zurich Bruker IFS spectrometer ZP 2001[c] and with the Bruker interferometer 2009 connected to the Swiss synchrotron[d] using a resolution of 0.0007 cm^{-1}. In addition, the IR spectrum of CDBrClF has been measured at low temperature with our diode laser jet setup in the ν_5 region. The spectra of the two major isotopomers $CD^{81}Br^{35}ClF$ and $CD^{79}Br^{35}ClF$ have been analysed within the ν_5 (CCl-stretch), ν_4 (CF-stretch) and ν_3 (CDF-bend) regions. A detailed rovibrational analysis of these bands is presented. The role for possible experiments in the experimental detection of molecular parity violation shall be discussed.

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