International Master 2 Atmospheric Sciences: Research Training 2020-2021

Laboratory: PhLAM

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CaPPA Work Package: WP-1 From gas phase to aerosols

Terahertz observations and modelling of water dimer absorption

Water vapor is a major absorber of both incoming solar radiation and reradiated heat, while it constitutes only about 0.25% of Earth's atmosphere mass. In addition to strong resonant lines from cm-waves to UV range, water vapor has a continuum absorption which varies slowly with frequency and reproduces approximately the resonant absorption bands envelop. Despite its relative weakness, the continuum contributes significantly to atmospheric absorption. This has a marked impact on the Earth's radiation balance with consequences for weather forecast and global climate change. It is generally accepted that in the pressure and temperature conditions of the Earth's atmosphere, the continuum is mostly originated from bimolecular absorption, within which it can be approximately separated into contributions of true bound (stable) dimers, quasibound (metastable) dimers and free molecular pairs. The goal of the internship is to study the high-resolution spectrum of the water dimer in the lower part of the terahertz range up to (0.5 THz) and to model the absorption of water and its dimer (resonant and continuum) in the Terahertz range.

Key words: terahertz – water – bimolecular species - continuum