THE TECHNOLOGY OF HIGH RESOLUTION TERAHERTZ SPECTROSCOPY

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The so called terahertz gap of the electromagnetic spectrum ranges approximately from 0.1 to 10 THz. Tuneable and coherent oscillators are barely available in this frequency range. For many years, we have been developing sophisticated terahertz spectrometers in Cologne. These are based on powerful, tuneable, and phase-locked backward wave oscillators (BWOs) covering frequencies up to 1.2 THz. The frequency accuracy in the phase locked mode is equal to the stability of our rubidium frequency standard. To extent the frequency range of the BWOs we have developed spectrometeres based on GaAs Schottky Barrier frequency multipliers. Most recently, we have introduced the first GaAs/InAs superlattice frequency multiplier with record output frequency. With these new sources at hand, we are about to close the gap up to 3 THz for high resolution and high accuracy spectroscopy.
In this contribution the different THz sources will be discussed and some interesting applications will be given.