SUB-DOPPLER MEASUREMENTS ON THE ROTATIONAL TRANSITIONS OF CARBON MONOXIDE

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The frequencies of the first six rotational transitions of the CO molecule have been measured to an accuracy of ± 500 Hz in the frequency region up to 700 GHz. This high level of accuracy was achieved with the Cologne terahertz spectrometer operated in the sub-Doppler mode (1). To carry out precise CO Lamb-dip measurements, widely tunable BWO's (OB-30, OB-32, and OB-80), phase-locked to a KVARZ synthesizer (78-118 GHz), were used. Least squares fits of the new CO data separately and together with our previous Doppler-limited measurements up to 1.3 THz (2) yielded rms values of 0.24 kHz and 0.26 kHz, respectively. The experimental setup and the results of a fit to the Lamb-dip data combined with the frequencies up to 4.3 THz ($J = 38 \leftarrow 37$) given by Evenson (3) will be presented. The analysis yielded a revised set of rotational constants for CO in its vibrational ground state, which is in good agreement with the previous values given by Varberg and Evenson (4).

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