PRESSURE BROADENING AND SATURATION LINESHAPES OF CO AT PRESSURES BETWEEN 10^{-2} PA AND 10^{2} PA

P. PALM, D. HANKE, M. MÜRTZ, B. FRECH, T. KAYSER, and W. URBAN, *Institut für Angewandte Physik der Universität Bonn, Wegelerstraße 8, 53115 Bonn, Germany*.

Saturated absorption lineshapes of rovibrational transitions in the CO fundamental band were measured at pressures between 10^{-2} Pa and 10^{2} Pa in pure CO, CO-He, and CO-Ar mixtures at a spectral resolution of better than $\delta\nu/\nu = 10^{-9}$. Data was recorded using a new high resolution saturation spectrometer based on a CO fundamental band laser, frequency stabilized to narrow saturation dips in OCS by the use of tunable microwave sidebands. The laser has up to 40 mW of output power on the $v = 1 \rightarrow 0$ band, a linewidth of less than 10 kHz, a long term frequency stability of better than $\Delta\nu/\nu = 10^{-11}$, and is linearly tunable with full frequency control within the gain profile of each laser line. Absorption cells with lengths between 0.04 m and 24 m and beam diameters between 1 mm and 30 mm were used.

The saturation signals mainly consist of narrow dips with a homogenous width that nonlinearly depends on pressure due to contributions of elastic as well as inelastic collisions and a broader, also pressure dependent background due to velocity changing collisions (VCC). A complex model is fitted to the data in order to separate different contributions to the lineshapes. Inelastic collisions as well as the VCC background can provide information about the intermolecular potentials and the well unterstood CO can serve as a model system for this approach.