

## HIGH RESOLUTION TDL SPECTROSCOPY OF THE Ar-CH<sub>4</sub> COMPLEX

M. WANGLER, D. A. ROTH, I. PAK, and G. WINNEWISSER, *I. Physikalisches Institut, Universität zu Köln, Zùlpicher Str. 77, 50937 Köln, Germany*; M. GELEIJNS, P.E.S. WORMER, and A. VAN DER AVOIRD, *Institute of Theoretical Chemistry, University of Nijmegen, Toernooiveld 1, 6525 ED Nijmegen, The Netherlands*.

The spectrum of the weakly bound complex Ar-CH<sub>4</sub> in the 7  $\mu\text{m}$  region was discovered, analysed, and compared with a spectrum, predicted from *ab initio* calculations. The measurements were made by probing a supersonic gas expansion with a tunable diode laser (TDL). Several bands of Ar-CH<sub>4</sub> associated with different ro-vibrational transitions of the  $\nu_4$  vibration of CH<sub>4</sub> were recorded and analyzed in a spectral region from 1295 to 1330  $\text{cm}^{-1}$ . In particular the following transitions were studied:  $j = 1 \leftarrow 0$  (@ 1311  $\text{cm}^{-1}$ ) reported in [Z. Naturforsch. **53**, 725 (1998)],  $j = 0 \leftarrow 1$  (@ 1301  $\text{cm}^{-1}$ ),  $j = 1 \leftarrow 1$  (@ 1306  $\text{cm}^{-1}$ ),  $j = 2 \leftarrow 1$  (@ 1316  $\text{cm}^{-1}$ ), and  $j = 3 \leftarrow 2$  transitions (@ 1322  $\text{cm}^{-1}$ ). Here,  $j$  denotes the angular momentum of the methane unit inside the complex. The experimental results are compared with *ab initio* calculations. The close agreement between observed and *ab initio* spectra is convincingly demonstrated with respect to the gross spectral features, including many details of the spectra.