HIGH RESOLUTION TDL SPECTROSCOPY OF THE Ar–CH_4 COMPLEX

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The spectrum of the weakly bound complex Ar–CH_4 in the 7 μm 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_4 associated with different ro-vibrational transitions of the ν_4 vibration of CH_4 were recorded and analyzed in a spectral region from 1295 to 1330 cm^{-1}. In particular the following transitions were studied: $j = 1 \leftarrow 0$ (@ 1311 cm^{-1}) reported in [Z. Naturforsch. **53**, 725 (1998)], $j = 0 \leftarrow 1$ (@ 1301 cm^{-1}), $j = 1 \leftarrow 1$ (@ 1306 cm^{-1}), $j = 2 \leftarrow 1$ (@ 1316 cm^{-1}), and $j = 3 \leftarrow 2$ transitions (@ 1322 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.