HIGH RESOLUTION INFRARED SPECTROSCOPY ON SMALL CARBON CLUSTERS

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Carbon containing molecules play a dominant role in interstellar chemistry. Small pure carbon chain molecules have been found as constituents in a variety of extrasolar sources, such as the tails of comets, shells of late type stars and in star forming regions of interstellar clouds. As pure carbon chains display no rotational spectrum, it is inevitable to look for the IR-active vibrational stretching modes and for low bending modes in the far-IR. Furthermore, the rotationally resolved spectra provide information about the chemical structure. As the growth process of fullerenes is still not well understand, the examination of larger clusters may assist the development of new theoretical models.

In our laboratory, the clusters are produced in an UV-laser ablation source and detected by a high resolution infrared diode laser spectrometer. Up to now we were able to assign the linear forms of several pure carbon clusters. In the last years we mainly concentrated on the even numbered species because of their spectroscopically interesting triplet splittings. We were able to detect e.g. the linear species of C_8 and C_{10}, both being first detections in the gasphase. Unfortunately, for C_8 only a tentative assignment could be derived[a]. As a consequence the band center of C_8 remained uncertain by 4 J. After re-building our experiment, we now have the capability to have a closer look at the band center, which leads to a far better understanding of the spectrum. New measurements as well as actual results will be presented.

[a] P. Neubauer-Guenther, T. F. Giesen, U. Berndt, G. Fuchs, G. Winnewisser *Spectr. Chim. Acta A* **59** 431-441 (2002)