ROTATIONAL SPECTROSCOPY OF 2- AND 4-CYANOBIPHENYL

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The class of polycylic aromatic hydrocarbons (PAHs) presents an important motif in building the chemical environment of the interstellar medium. Around 10 to 25% of all interstellar carbon is thought to be locked up as PAHs. Recently benzonitrile[a] as well as 1- and 2- cyanonapthalene ($C_{10}H_7CN$), have been identified in radio observations of TMC-1[b] based on their laboratory rotational spectra. The detection of these molecules raises possibilities for the presence/formation of other cyano-aromatic molecules in the interstellar medium.

In this work, we present chirped-pulse Fourier transform microwave (CP-FTMW) spectra of 2- and 4-cyanobiphenyl (CBP) [$C_{12}H_9CN$], that are cyano-aromatic molecules. They are measured in the frequency range from 11.5 to 27 GHz. The Cologne CP-FTMW instrument has been designed to achieve high stability and sensitivity, which made it possible to measure the ^{13}C isotopologs in natural abundance. In a recent modification to the instrument, we are using state-of-the-art RF modulation and detection technology to directly generate and receive signals in this frequency range, thus abandoning the up- and down-mixing processes of our previous chirped-pulse microwave spectrometer setup[c]. As a result, the tedious side-band separation is no longer needed. Moreover, the number of elements influencing the intensities is reduced to a minimum. The setup and the results of the CBP measurements will be presented.

[a] B. A. McGuire et al., *Science* **359** (2018) 202–205.
[b] B. A. McGuire et al., *Science* **371** (2021) 1265–1269.
[c] M. Hermanns et al., *Journal of Molecular Spectroscopy* **358** (2019) 25-36.