IMPROVEMENTS IN STARK EFFECT MEASUREMENTS IN A PULSED NOZZLE FOURIER TRANSFORM MICROWAVE SPECTROMETER

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Stark effect measurements in a molecular beam Fourier transform microwave (FTMW) spectrometer yield the electric dipole moment of molecular systems in the gas phase, a piece of chemical information especially important to elucidate the geometry of weakly bound complexes.

One of the first applications of the Stark effect to determine dipole moments with a pulsed nozzle FTMW spectrometer goes back to more than 10 years ago, when the NIST group at Gaithersburg determined the dipole moment of the water dimer [a].

Since then the coaxially oriented beam-resonator arrangement was introduced [b], but Stark effect experiments performed in a FTMW spectrometer with the pulsed molecular beam parallel to the resonator axis using the conventional electrode geometry suffer from an inhomogeneous field distribution. This gives rise to broadened profiles of the Stark shifted lines and a persistent zero-field line.

Our new configuration provides a considerable improvement in resolution and sensitivity in comparison to the widely used arrangement where the electrode array has a cubic geometry and the molecular beam points perpendicular to the resonator axis[c]. The performances of the novel design electrodes and the improvements achieved will be demonstrated by several examples.

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[b] J.-U. Grabow and W. Stahl, *Z. Naturforsch.* **45a**, 1043(1990).

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