CHIRPS: ADIABADIC RAPID PASSAGE USING THZ AND MICROWAVE SOURCES IN MERGED BEAM EXPERIMENTS

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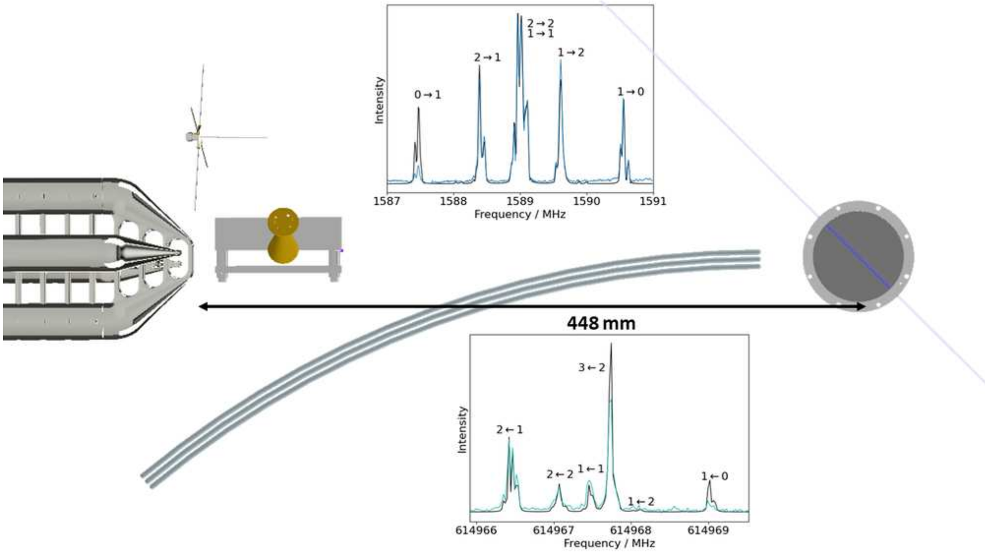

To study bimolecular collisions at low collision energies, we merged two molecular beams of deuterated ammonia. One beam (the primary beam) is controlled using a Stark decelerator, which is a device that exploits the Stark effect to control the velocity of a molecular beam while at the same time acting as a state separator. The second beam passed through a curved hexapole. Both state separators produced nearly pure beams of $\mathrm{para-ND_3}$ in the rotational ground state $J^{\pm}_{|K|} = 1^-_1$ with the sign in the exponent denoting the parity. However, deflection of the primary beam by electric field gradients from the curved hexapole posed a fundamental limitation regarding the phase-space overlap of the merging beams. I will show different attempts to overcome these deflection problems by changing the quantum state of the molecules in the primary beam using microwave ($1.6\ \mathrm{GHz}$) and THz ($615\ \mathrm{GHz}$) radiation - employing the principles of adiabatic rapid passage - but also by redesigning the experimental setup.