

Roller coaster with cold molecules

Quantum effects play a central role in low temperature collisions. Particularly important is the formation of metastable scattering resonances that lead to temporary trapping of the colliding particles. Observation of such states has long been limited to laser cooled species, leaving chemically relevant molecules such as hydrogen out of reach. I will present our method that uses high magnetic field gradients to merge two molecular beams circumventing the laser cooling step. It allows us to perform collisions with molecular hydrogen at energies reaching 0.001 K. I will show the fingerprints of quantum resonances on observable properties and also highlight the astounding effect of the internal molecular structure and symmetry. Finally, I will discuss how a moving magnetic trap decelerator can serve as stepping stone towards the direct laser cooling of diatomic radicals.