



26.08.21 - 9:15 h

At Zoom virtual meeting: <https://desy.zoom.us/j/83631120632>

Meeting ID: 836 3112 0632 Password: 235618

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"Quantum effects in cold molecular collisions "

At low temperatures below a few Kelvin, atomic and molecular collisions are dominated by quantum effects such as interferences, tunneling, and resonances. Experimental investigation of these effects provides a rigorous test for ab-initio potentials and helps in improving our understanding of fundamental processes paving our way up to many-body systems, yet it remains extremely challenging to resolve these quantum signatures in laboratory measurements. In our lab, we use the merged beam technique which allows us to study the interaction between neutral particles from room temperature down to a few millikelvin. By combining this method with velocity map imaging detection, we are able to probe the dynamics of cold molecular collisions. In my talk, I will show how this unique apparatus allows us to probe the wave nature of particles in the cold regime leading to diffraction oscillations in elastic collisions. I will further show how we can experimentally distinguish between different mechanisms of resonance formation-quantum tunneling and quantum reflection above a potential barrier. In the next part of my talk, I will tell how cold Penning ionization reactions can be used as a preparatory step for studying the interactions between cold neutral atoms and molecular ions with rotational state resolution.