

Ultracold polar molecules

Silke Ospelkaus

Institut für Quantenoptik, Leibniz Universität Hannover, Germany
silke.ospelkaus@iqo.uni-hannover.de

Ultracold polar molecules offer unique opportunities to explore fundamental questions in quantum chemistry, quantum simulation, and many-body physics. In this talk, I will provide an overview of the state-of-the-art techniques for preparing ultracold molecular samples. These include both the indirect approach of associating ultracold atoms into molecules, effectively realizing a controlled chemical reaction, as well as direct cooling techniques applied to preexisting molecules.

Building on this foundation, I will highlight recent experimental advances involving ultracold molecular systems. Particular emphasis will be placed on studies of molecular collisions, the control of collisional properties via external fields, and the emergence of dipolar many-body phenomena in strongly interacting molecular gases.