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Fachbereich Physik, Universität Stuttgart
Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme

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Cold and ultra-cold polyatomic molecules for quantum science

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Abstract

Polar molecules, due to their intrinsic electric dipole moment and their controllable complexity, are a powerful platform for precision measurement searches for physics beyond the standard model (BSM) and, potentially, for quantum simulation/computation. This has led to many experimental efforts to cool and control molecules at the single quantum state level. Polyatomic molecules have attracted new focus as potential novel quantum resources with distinct advantages - and challenges - compared to both atoms and diatomic molecules. I will discuss features of polyatomic molecules can be used in quantum simulation/computation, the search for BSM physics, and ultracold chemistry. I will discuss our results on the laser cooling of molecules into the ultracold regime, including the laser cooling of the polyatomic molecules SrOH, YbOH, CaOH and $CaOCH_3$. Finally, if time permits, I will discuss recent measurements that support the vision of extending laser cooling to larger molecules.