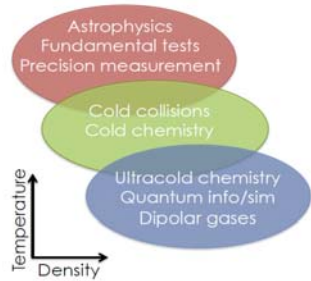


Laser Cooling of Dipolar Molecules 4YR		Start Date: February 1st 2017
PhD: Ralf Albrecht (Stuttgart, starting January 2018)	PIs: Dr. Tim Langen (Stuttgart)	
 <p>Fig 1: Applications of cold molecules. Achieving lower temperatures and higher densities is imperative to realize new applications at the interplay of physics and chemistry.</p>		
<p>Abstract: Full quantum control of molecules has been an outstanding goal for decades. Cooling molecules provides a most promising answer to address this challenge. With recent progress in experimental quantum physics, such cooling is finally within reach.</p> <p>The aim of this project is to demonstrate the novel technique of molecular laser cooling for a gas of barium monofluoride (BaF) molecules. BaF is particularly well suited for this goal, as intense pulses of ground state molecules can be created using laser ablation and buffer gas cooling. Furthermore, BaF features a favorable level structure for general laser cooling and an additional narrow transition that promises very low Doppler temperatures on the order of 10μK.</p> <p>Reaching such low temperatures with a gas of these dipolar molecules will pave the way for a large number of novel and interdisciplinary applications ranging from few- and many-body physics to cold chemistry and tests of fundamental symmetries.</p>		
<p>Recent results:</p> <ul style="list-style-type: none"> • <i>Setup of the cryostat and the ablation laser for the cold buffer gas source.</i> • <i>Design of the cooling laser system and setup of the first lasers.</i> • <i>PI has been awarded a fellowship for the "Eliteprogramm" for young researchers by the Baden-Württemberg Foundation and a Marie Skłodowska-Curie fellowship by the European Commission.</i> • <i>Presentation of the research project and of IQST at the Forschungstag Baden-Württemberg.</i> • <i>Related project on using cold BaF molecules for precision measurements of parity-violating effects will be part of the joint Ulm/Stuttgart proposal for a new DFG collaborative research center.</i> • <i>Applications for ERC Starting Grant and DFG Emmy Noether program are in preparation.</i> 	<p>Publications: -/-</p>	