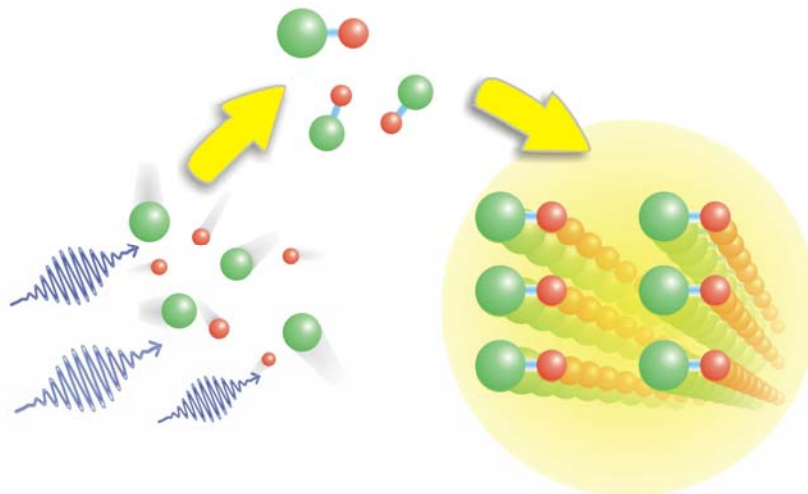


## Ultracold molecules and the quest for chemistry without entropy

Matthias Weidemüller, Physics Institute, University of Heidelberg

Recent experimental advances in the preparation of sources of cold atoms and cold molecules have made it possible to create gas-phase molecules to temperatures close to absolute zero with full control over their internal and motional degrees of freedom. Translational temperatures in the microkelvin range have been achieved for molecules in optical traps, and even quantum degenerate gases of weakly bound molecules have been experimentally realized. Such developments now provide us with the opportunity to open a new domain of reaction dynamics where processes are governed by collective quantum phenomena at vanishing entropy.

After a general introduction into the field, the presentation will focus on the formation and the interaction of ultracold polar molecules made from optically cooled and trapped atomic gases.



*Schematic illustration of the formation process for a gas of dipolar molecules.*