

## Einladung zu einem Kolloquium

Datum/Zeit: **Dienstag, 23.04.2024, 16.45 Uhr**

Referent: **Prof. Timothy Softley**  
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Titel: *Cold molecules, ions and Rydbergs - what value for chemistry?*

Ort: **HCI G7**

A diversity of experimental techniques has been developed over the last 25 years to create samples of molecular gases at temperatures close to the Absolute Zero - from 10s of Kelvin ('cold') down to 100s or even 10s of nanoKelvin ('ultracold'). The motivations for this work have included performing very high precision spectroscopy on the molecules for testing concepts of fundamental physics, using ultracold molecules as qubits in quantum computation, creating arrays of molecules that mimic condensed matter systems, and – of most relevance to this talk - developing the ability to study chemical reactions at such temperatures. In these exotic physical environments, a range of novel experiments can potentially be conducted that utilise the high levels of control over the properties of the molecules including internal quantum states and translational motion. In some cases, control and observation of reactions at a single-molecule level is achievable. This is a world where quantum effects are expected to become more visible in the kinetics and dynamics of collisional processes as the temperature lowers. In this talk, I will give a perspective on where the 'cold and ultracold chemistry' field stands currently, with examples from my own research in the field of cold ion-molecule collisions and from the work of others. I will focus on examples where the properties of the transient 'reaction complex', formed on collision, determine the outcomes of the chemical reaction and hence make a connection to studies of molecular reaction dynamics at higher temperatures.

Heazlewood BR, and Softley TP, 2021 'Towards chemistry at absolute zero', Nature Reviews Chemistry 5, 125.

Softley TP, 2023 'Cold and ultracold molecules in the twenties', Proceedings of the Royal Society A, 479 20220806 DOI 10.1098/rspa.2022.0806

**Gäste sind willkommen**