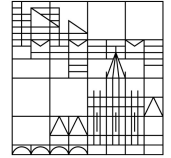


# Physikalisches Kolloquium

Universität  
Konstanz

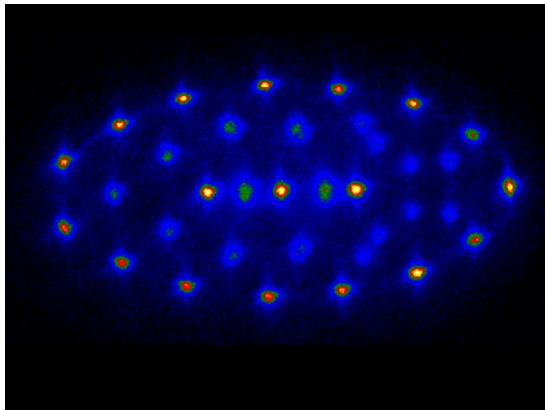


Di 25.01.22  
15:15 Uhr  
A 701



**Prof. Dr. Tobias Schätz**  
Albert-Ludwigs-Universität Freiburg

## Catching the wave - Optical Traps for controlling Ions & Ultracold Atoms in the quantum regime



Isolating ions and atoms from the environment is essential for experiments, especially if we aim to study quantum effects. For decades, this has been achieved by trapping ions with radiofrequency (rf) fields and neutral particles with optical fields. We are trapping ions by the interaction with light and electrostatic fields, in absence of any rf-fields. We take our results as starting point for studying how to combine the advantages of optical trapping and ions.

In the first part of the talk, we will focus on the basics of optically trapping ions. In the second part we aim to demonstrate the prospects of our approach in the context of interaction and reaction at ultra-low temperatures as a showcase. Following the seminal work in other groups in hybrid traps, we embed optically trapped ions into quantum gases to reach lowest temperatures, circumventing the currently inevitable excess kinetic energy in hybrid traps, where ions are kept but also driven by rf-fields. It permits to enter the temperature regime where quantum effects are dominating and controllable via Feshbach resonances.

We will discuss our recent results on optically trapping  $^{138}\text{Ba}^+$ ,  $^{87}\text{Rb}$  and  $^6\text{Li}$  atoms in hybrid- and bi-chromatic dipole traps, related challenges and perspectives.