



CRC 1227
Designed Quantum States of Matter



GUEST LECTURE

Prof. Dr. Tobias Schätz

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at Albert-Ludwigs-Universität Freiburg
(Guest of Prof. Dr. Piet Schmidt
and Prof. Dr. Klemens Hammerer)

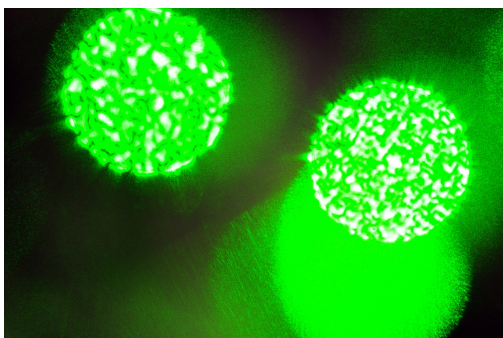
Leibniz Universität Hannover
Welfengarten 1, 30167 Hannover
(building 1101)
Seminar room D326
at the Institute of Quantum Optics
11 January, 2018, 3:30 pm

"Optically Trapping and Isolating Ions for Seconds"

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.

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 the groups of Vuletic, Koehl and Denschlag in hybrid traps, we plan to 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 might permit to enter the temperature regime where quantum effects are predicted to dominate.

I will report about our recent results on optically trapping $^{138}\text{Ba}^+$ in a bi-chromatic far-off-resonant dipole trap sufficiently isolated and providing lifetimes of seconds. In addition, I aim to discuss the prospects for Coulomb Crystals within optical traps.



**All DQ-mat members and all interested
are cordially invited to attend.**