



## IRTG-Joint-Seminar

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### **“Ultracold Ions in a Fermionic Sea - Outline of a Novel Experiment”**

Examining interactions of ions with neutral atoms in the ultracold regime will permit gaining information about corresponding sympathetic cooling rates and subsequent quantum effects. In recent years various groups investigated cold collisions between atoms and ions, leading to a better understanding of the atom-ion interaction [1-2]. Our approach to reach the regime of ultracold interaction and s-wave scattering is to precool a  $Ba^{+}$  ion, trapped in a conventional radio-frequency (RF) Paul trap by Doppler cooling. By overlapping the ion with an optically trapped Lithium cloud the s-wave scattering limit should be reachable [3]. In order to reach temperatures below the limitations set by heating due to RF micromotion we plan to trap both the ion and the atoms optically [4] in the same trap. This should allow to enter into a regime entirely dominated by quantum statistics. In the talk I will present our current plans of the apparatus and discuss experimental challenges.

- [1] L. Ratschbacher et al., Nature Phys. 8, 649 (2012)
- [2] F. H. J. Hall et al., Mol. Phys. 111, 1683-1690 (2013)
- [3] M. Cetina et al. Phys. Rev. Lett. 109, 253201 (2012)
- [4] T. Huber et al., Nat. Comm. 5, 5587 (2014)

**Tuesday, June 28<sup>th</sup>, 2016, 6:00 p.m.,  
University Computing Center, Room 023  
Hermann-Herder-Str. 10**