

# QUANTUM OPTICS SEMINAR



**Title:** Optical Cooling of bosonic cesium and fermionic lithium

**Speaker:** Romain Müller  
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**Time:** Friday, November 11 at 10:15

**Room:** 1525-323

**Abstract:**

The ability to precisely control the interactions in a Bose-Fermi mixture of  $^{133}\text{Cs}$  and  $^6\text{Li}$  at phase-space densities close to quantum degeneracy results in the opportunity to study many different aspects of few- and many body physics in a system with the highest mass imbalance between stable alkali atoms. Concerning few body effects, the extremely large mass-difference of Li and Cs results in the smallest scaling factor of all alkali combinations for the appearance of universal Efimov states of 4.88 (in comparison to 22.7 for homo-nuclear mixtures) for  $^{133}\text{Cs}_2\ ^6\text{Li}$ . A precise control over the scattering length via magnetic fields (i.e. *Feshbach resonances*) enables the observation of a large series of these trimer states [1] [2]. Additionally, LiCs dimers are particularly promising candidates for observing dipolar effects, as it possesses the largest dipole moment of 5.5 Debye of all alkali dimers [3]. The talk presents the current developments of our experimental setup focusing on magneto-optically trapped  $^6\text{Li}$  and the optical dipole trap for  $^{133}\text{Cs}$ .

References

- [1] E. Braaten and H.-W. Hammer, *AnnPhys* 322, 120 (2007)
- [2] K. Helfrich et al., *PRA* 81, 042715 (2010)
- [3] J. Deiglmayr et al., *Phys. Rev. A* 82, 032503 (2010)

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