

Towards single atom manipulation in Superlattices

***R. Müller, N.Byg, J. Knokneryté, R. Heck, M. Bason, J. Arlt,
J.F. Sherson***

*Department of Physics and Astronomy, Aarhus, Denmark
mueller@phys.au.dk*

The control of individual quantum systems is an extremely important topic, as evidenced by the Nobel prize 2012. In the past couple of decades accurate control has been extended to systems such as individual photons, atoms, and ions. The current challenge consists in assembling complex quantum states of several constituents. A major advance in this direction has been the direct observation [1, 2] and control [3] of individual atoms in optical lattices. In a new experiment, we pursue the precise manipulation of single to few atoms using long period optical superlattices. This offers a path to high fidelity complex quantum state control [4], which is more robust to experimental errors [5].

References:

- [1] J.F. Sherson, Nature 467,68–72 (2010)
- [2] M. Greiner, Science 329, 547 (2010)
- [3] C. Weitenberg, Nature 471, 319 (2011)
- [4] M.Tichy, <http://arxiv.org/abs/1301.2991> (2013)
- [5] C. Weitenberg, Phys. Rev. A 84, 032322 (2011)