Q 52 Gruppenbericht Fallen und Kühlung

Zeit: Mittwoch 14:00–14:30 Raum: HII

Gruppenbericht

Q 52.1 Mi 14:00 HII

Manipulating strings of atoms for deterministic atom-photon coupling — •Igor Dotsenko, Wolfgang Alt, Leonid Förster, Mkrtych Khudaverdyan, Dieter Meschede, Yevhen Miroshnychenko, Sebastian Reick, and Arno Rauschenbeutel — Institut für Angewandte Physik, Universität Bonn, Wegelerstrasse 8, D-53115 Bonn

The realization of controlled coherent interaction between neutral atoms, which is the main milestone on the way to quantum computation with neutral atoms, is the central field of interest in our research group. For the initial preparation of the atom number, necessary for any planned experiments, we have established a feedback technique of non-Poissonian loading of up to 20 atoms into a standing wave optical dipole trap. The prepared atoms form a linear string which can serve as a quantum register for storing quantum information. Using optical tweezers, we can manipulate strings of atoms in order to improve the performance of the register. By extracting and reinserting atoms at predetermined positions, we control the interatomic distances with sub-micrometer precision, build equidistant strings, and rearrange their order. To realize quantum operations, we plan to deterministically place two atoms into the cavity mode of an optical Fabry-Perot resonator using our optical "conveyor belt" technique. In the resonator the interaction between the atoms can be significantly enhanced by the exchange of a virtual cavity photon.