SFB/TRR 21 - Colloquium

11. Mai 2012, Ulm

CO.CO.MAT

Sebastian Slama

(Universität Tübingen)

Strong cooperativity of ultracold atoms and surface plasmons

Hybrid quantum systems are the subject of extensive research worldwide. The great interest in these systems is motivated mainly by the prospect of coherent interactions and entanglement between the individual units. This requires precise control over the involved quantum systems. Presently, the best control over quantum matter is achieved with clouds of ultracold atoms. They can be isolated from the surroundings in miniaturized magnetic and optical traps on atom chips and thus suffer very little intrinsic decoherence. However, strong coupling of atoms with optical fields typically requires the storage of optical excitations in ultrahigh-finesse cavities.

We pursue a complementary new approach which is based on the interaction of ultracold atoms with plasmonic excitations. We are working on the generation of surface traps for cold atoms close to plasmonic nanostructures in order to enable strong cooperativity between single atoms and single plasmons. Along this way physical effects have to be faced like Casimir Polder forces which are typically strongly attractive and can lead to the loss of atoms from the trap. I will report on our experiments with cold atoms at submicron distances from solid surfaces with partially integrated plasmonic structures.

11. Mai 2012, 14:00 Uhr

Universität Ulm, Raum N24/ 252
Albert-Einstein-Allee 11, 89081 Ulm