

Cold Atoms near Surfaces and in Optical Cavities

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I will discuss two experiments which we currently carry out in Tübingen. The first project explores new ways to construct arbitrary potential landscapes for cold atoms by means of surface plasmon polaritons. Different to conventional atom chips, the potentials can vary on a much smaller spatial scale and may eventually allow for generating lattice structures below 100nm. In the second experiment, Bose-Einstein condensates are placed inside an optical ring resonator. This scenario features a number of fascinating collective phenomena ranging from classical self organization and Mie scattering to Subradiance and Dicke quantum phase transitions.