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Einladung zum Physikalischen Kolloquium

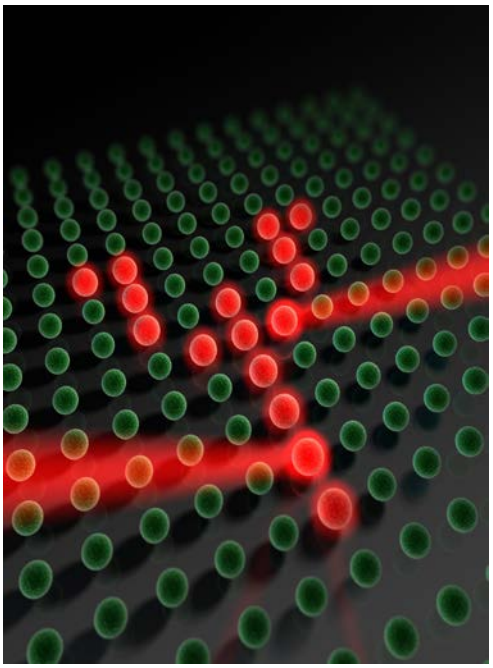
Montag, 02.12.2013
16:15 Uhr in N24/H13

Prof. Dr. Immanuel Bloch

Max-Planck-Institut für Quantenoptik Garching
Fakultät für Physik, Ludwig-Maximilians-Universität München

Controlling and Exploring Quantum Matter at the Single Atom Limit

Over the past years, ultracold quantum gases in optical lattices have offered remarkable opportunities to investigate static and dynamic properties of strongly correlated bosonic or fermionic quantum many-body systems. In this talk, I will show how it has recently not only become possible to image such quantum gases with single atom sensitivity and single site resolution, but also how it is now possible to coherently control single atoms on individual lattice sites and to reveal the presence of individual quantum fluctuations of the many-body system. This unique control has recently allowed us to realize novel quantum crystals of matter using Rydberg atoms. I will also demonstrate how 'Higgs' type excitations occur at 24 orders of magnitude lower energy scales than in high energy experiments and how they can be detected in our experimental setting. Finally, I will show how the unique control over ultracold quantum gases has enabled the creation of negative temperature states of matter and thereby the realization of Bose-Einstein condensation at absolute negative temperatures.



Ab 15.45 Uhr Kaffee, Tee und Kekse vor dem Hörsaal H13

Organisation: Prof. Jelezko Tel.: 23750
Host: Prof. Hecker Denschlag Tel.: 26100, off: 26101