

# Großes Physikalisches Kolloquium an der Universität zu Köln

## Prof. Dr. Peter Zoller

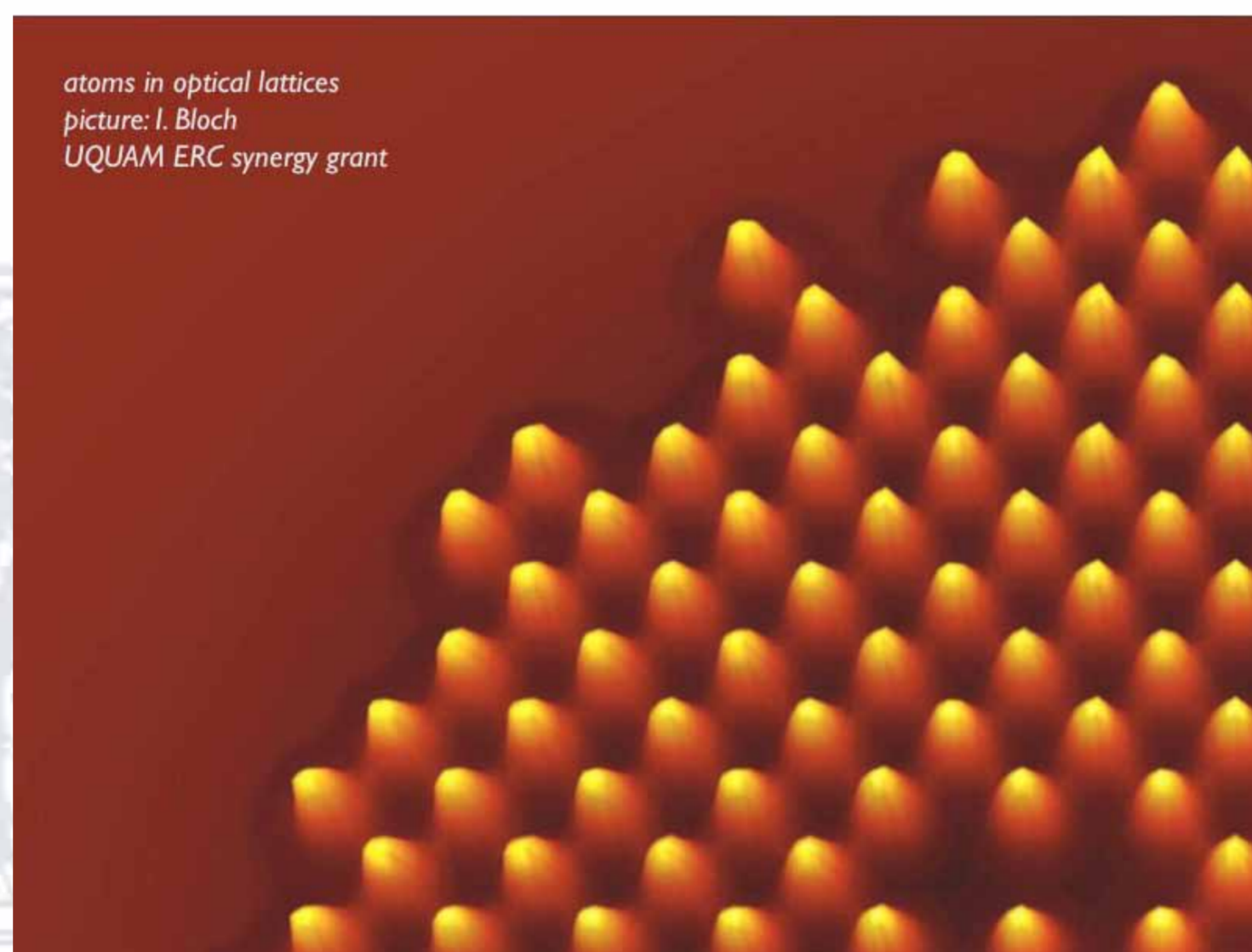
University of Innsbruck and Austrian Academy of Sciences



## *Quantum Simulation with Cold Atoms and Ions*

Quantum optical systems of atoms, ions and photons can be controlled and manipulated on the level of single quanta. This provides a framework for generating highly entangled quantum states in the laboratory, and for the realization of quantum computers and quantum simulators in particular. It is the goal of quantum simulation to simulate quantum dynamics of complex many-particle quantum systems, and of on strongly correlated condensed matter systems in particular. In the first part of the talk we will develop the theoretical concepts of digital and analogue quantum simulation, which we illustrate with atoms in optical lattices, Rydberg atoms and trapped ions chains.

The second part of the talk addresses topics of recent interest, in particular quantum simulation of lattice gauge theories with perspectives in condensed matter and high energy physics, and open system quantum simulation with engineered couplings to an environment.



15.12.2015

16<sup>45</sup> Uhr / HS III

