Q 19 Preisträgervortrag Max-Planck-Medaille 2005

Zeit: Montag 10:00–10:45 Raum: HU Audimax

Hauptvortrag Q 19.1 Mo 10:00 HU Audimax

Preisträgervortrag Max-Planck-Medaille 2005 — Cold atoms: from quantum information to condensed matter physics — •Peter Zoller — Institute for Theoretical Physics, University of Innsbruck, and Institute for Quantum Optics and Quantum Information of the Austrian Academy of Sciences, Innsbruck, Austria — Träger der Max-Planck-Medaille

We discuss implementation of quantum information processing with quantum optical systems, and the new emerging interface with between atomic physics and condensed matter physics.

We begin our discussion with a brief summary of quantum computing scenarios based on a quantum logic networks and measurement based quantum computing. We will first focus on various mechanisms to entangle atoms, including optimized quantum gates, and engineering of various quantum states as a quantum computing resource. As a second aspect, we will discuss the emerging connections between cold atoms in optical lattices and condensed matter lattice models, with emphasis on realizing and simulating strongly correlated systems and exotic quantum phases. We will conclude with a brief discussion of quantum optical systems as a probe and tool in mesoscopic physics.