Donnerstag, den 27.11.2014 um 15:30 Uhr in Raum 46-576

Es spricht:
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zum Thema:
Wannier-Stark states of a quantum particle in double-periodic 2D lattices

Abstract
By definition, Wannier-Stark states are the eigenstates of a quantum particle in a periodic potential in the presence of a static field $F$. For a simple 1D lattice of the period $a$ the spectrum of WS-states is a set of energy levels with the level spacing $aF$, known as the Wannier-Stark ladder. The equidistant spectrum implies periodic dynamics of the particle which is nothing else as celebrated Bloch oscillations. If the lattice period is doubled, Bloch oscillations become a quasiperiodic process because of the Landau-Zener tunneling between two subbands that emerge from single Bloch band due to the period doubling. In the past decade Bloch oscillations and Landau-Zener tunneling in 1D double-periodic lattices have attracted much attention in cold atoms physics and photonics thank to applications to interferometric measurements and as a method for manipulating localized wave-packets. In the talk I review theory of WS-states in 1D double-periodic lattices and show how the interband Landau-Zener tunneling is encoded in these states. Then I extend the theory to 2D double-periodic lattices. The fundamental difference of 2D lattices as compared to 1D lattices is that the Wannier-Stark spectrum and WS-states depend not only on the strength of a static field but also on its orientation relative to the primary axes of the lattice. This opens a pandora of spectral and dynamical effects which I shall discuss in the talk.

Gäste sind herzlich willkommen. Die Dozenten der Theoretischen Physik