

**PHYSIKALISCHES KOLLOQUIUM**  
**EINLADUNG**

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speaks

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about

**„Artificial gauge fields in driven optical lattices“**

Atomic quantum gases are neutral, and therefore, not affected by external electromagnetic fields in the way electrons are. The realization of artificial gauge potentials for neutral atoms constitutes therefore a major achievement for the emulation of condensed matter models with quantum gases. Diverse static gauge potentials that effectively emerge in the atomic dynamics can now be experimentally engineered: Abelian gauge potentials, giving rise to synthetic electric and magnetic fields as well as non-Abelian gauge potentials. A well-known example is spin-orbit coupling, which links a particle's velocity to its quantummechanical spin.

In this perspective, periodically driven optical lattices constitute a versatile tool, which allows controlling both phase and amplitude of the tunneling parameters. In the presence of complex hopping parameters, the atomic gas can mimic the dynamics of an electron gas subjected to an external magnetic field. Furthermore, one can also emulate a 1D spin-orbit coupling in a system of periodically driven ultracold, neutral atoms with two internal spin states.

All interested persons are cordially invited.

Gez. Prof. Dr. Martin Holthaus