



Physikalisches Kolloquium

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Ultrafast optoelectronics and strong field effects in semiconductors

Thirty-one years ago, the first experimental verification of Bloch oscillations, i.e., the oscillatory spatial motion of electrons in periodic potentials in the presence of static electric fields, has settled a long-lasting debate and motivated a huge number of further studies in semiconductors and other, e.g., atomic and photonic, systems. Besides static fields (or forces or bias in other systems) several works investigated effects like dynamical localization that may arise in the presence of oscillating fields and various combinations of static and time-dependent fields were explored.

More recently, the availability of extremely intense optical and Terahertz fields of strengths which are comparable to intraatomic fields made it possible to study matter under very extreme conditions. In particular, high harmonic generation and related phenomena have received tremendous attention as they can provide detailed information about the underlying ultrafast dynamics on the microscopic scale. I will introduce a theoretical approach which provides a unified framework to describe the abovementioned effects by including both field-induced inter- and intraband excitations in the semiconductor Bloch equations and discuss a few selected examples.

Tuesday, May 2, 2023, 2:15 p.m.

H6