UNIVERSITÄT DUISBURG ESSEN

PHYSIK E=

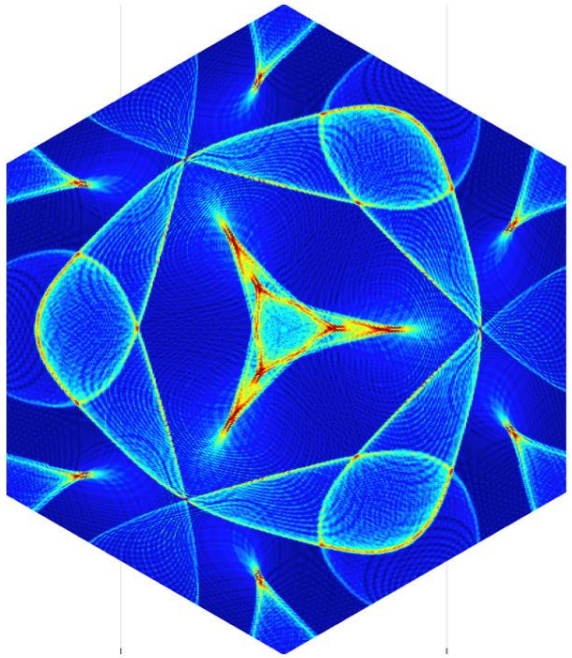
Physikalisches Kolloquium

Mittwoch, 22.06.2022
13:00 Uhr
Nur per Zoom

https://uni-due.zoom.us/j/61481460592?pwd=NTBkdk1xNWtFdnk1TTdtZkI0UllzUT09 (gilt für alle Vorträge)

The Magic of Moiré Materials

Prof. Dr. Allen H. Macdonald, University of Texas at Austin



Two-dimensional crystals that are overlaid with a difference in lattice constant or a relative twist form a moiré pattern. In semiconductors and semimetals, the low-energy electronic properties of these systems are described by Hamiltonians that have the periodicity of the moiré pattern, opening up a strategy to make artificial two-dimensional crystals with lattice constants on the ten nm scale. I refer to these artificial crystals as moiré materials. Because of their large lattice constants, the band filling factors of moiré materials can be tuned over large ranges without introducing chemical dopants simply by using electrical gates. Moiré materials, can be used to flexibly simulate the physics of real atomic scale crystals, and to create new states of matter. I will overview progress that has been made in understanding the low-temperature properties of the first moiré materials - twisted graphene in which electron velocities vanish at discrete magic angle, and transition-metal dichalcogenides that simulate atomic scale Hubbard model physics - and provide a perspective on prospects for future room-temperature applications of moiré materials.