

Prof. Dr. Peter Hommelhoff
 Chair of Laser Physics
 FAU Erlangen-Nürnberg



Coherent ultrafast electron control in graphene - and in light-dressed graphene

physikalisches

Mo. 13.1.25
 16:00 Uhr
 Ort: H34

The 2023 Nobel Prize in Physics to the pioneers of attosecond physics highlighted coherent electron dynamics in atoms and molecules, leading to the generation of attosecond bursts of light.

Meanwhile, attosecond dynamics expanded to solids. In solids, too, electrons can be strongly driven by intense ultrashort laser pulses. Because the action happens on time scales of (sub-) femtoseconds, the electron dynamics happens fully coherently. Hence, the electron can be in a quantum-mechanical superposition state, hence electron interferometry inside of matter can be observed, and hence highly intriguing effects related to fully coherent electron matter wave dynamics can be observed.

The talk will show what we can do with strongly driven electrons in graphene. When we shine another light field at graphene, we can dress it with this light field, only to realize a light-dressed material. In the last part, we will show that we can generate a so-called light-dressed Floquet topological insulator: the graphene's properties are dramatically altered by the light-dressing, and we can probe this new topological band structure with the help of coherent electron dynamics.

