

Particle transport in strained graphene

Initiative: Zwischen Europa und Orient - Mittelasien/Kaukasus im Fokus der Wissenschaft

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Laufzeit: 2 Jahre

This project aims at the study of particle transport in graphene in the presence of external static and time-dependent perturbation. Central focus will be on external fields induced by straining of graphene sheets. Evolution of the wave packet will be studied for all relevant cases by solving stationary, 2D, massless Dirac equations, as well as within the tight-binding approach. The Landauer formula-based approach will be used to explore particle transport in strained and perturbed graphenes. Therefore the Green function of the zero-mass Dirac particle in static fields will be calculated. The problem of transmission through the potential barrier for all these cases by considering bulk graphene and its nanoribbons will be treated. The second part of the project will be focused on particle transport in graphene-perturbed time-dependent external fields. Time-dependent Dirac equations will be solved for all types of time-periodic potentials. Time-dependent particle transport in driven graphene will be studied in terms of wave packet evolution. The problem of particle transport in the presence of time-dependent barrier will be considered in this context. The third type of problem to be investigated is heat transport in perturbed bulk graphene and its ribbons. For this study the Kubo formula and non-equilibrium Green function approaches will be used.

Projektbeteiligte

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