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Transport and Tunneling in Twisted Bilayer Graphene Devices

Initiative: zukunft.niedersachsen (nur ausgewählte Ausschreibungen)

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Laufzeit:

The initial success in integrating single layer graphene into electronic circuitry has led to a vast effort to improve its properties and to gain control over its band structure. Recent progress in fabrication of vertical structures makes it possible to study graphene in multilayer environments. Such stacking of crystalline structures inevitably causes superlattice effects due to a mismatch of lattice constants or interlayer rotation. Therefore superlattice effects appear when two layers of graphene are stacked at an arbitrary angle. In such systems with twisted bilayers of graphene the band structure and interlayer coupling is expected to be fully determined by the relative angle between the stacked single layers. However experimental results vary greatly and there is no closed theoretical model on the electronic structure of these systems yet. Within the project twisted bilayer graphene devices are probed using 3 different measurement modes:(i) in-plane transport, seeking evidence of non-trivial Fermi surfaces and modifications to the Fermi velocity;(ii) interlayer transport - directly probing the interlayer coupling by driving current from one graphene layer to the other, and (iii) tunneling, probing the density-of-states of the twisted bilayer graphene system. Together, these measurements are expected to shed light on pertinent open questions in the field of twisted bilayers - the nature of interlayer coupling and its effect on layer hybridization being the most important one.

Projektbeteiligte

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Es werden die Institutionen genannt, an denen das Vorhaben durchgeführt wurde, und nicht die aktuelle Adresse.