



LUDWIG-  
MAXIMILIANS-  
UNIVERSITÄT  
MÜNCHEN

ARNOLD SOMMERFELD  
CENTER FOR THEORETICAL PHYSICS



# Sommerfeld Theory Colloquium

Prof. Alexander D. Mirlin

University of Karlsruhe

## Electron transport in graphene: Disordered 2D Dirac fermions

Charge carriers in graphene have a relativistic (massless Dirac) spectrum, which is responsible for remarkable electronic properties of this two-dimensional material. In this talk, I will first give a brief overview of the experimental results on transport properties of graphene samples. I will then present recent theoretical advances on electron transport in disordered graphene. Transport properties of the system are found to depend crucially on the character of disorder which influences the symmetry and the topology of the underlying field theory of disordered Dirac fermions. Particularly interesting situations emerge for long-range disorder which does not mix two Dirac "valleys" of the spectrum, as well as for the randomness that preserves one of the chiral symmetries of the clean Hamiltonian.

Topics to be discussed: (i) Anderson localization or its absence; (ii) anomalous quantum Hall effect; (iii) ballistic transport and evolution from the ballistic to the diffusive regime. The talk is based on results obtained in P.M. Ostrovsky, I.V. Gornyi, and A.D. Mirlin, *Phys.Rev.B* 74, 235443 (2006); *Phys.Rev.Lett.* 98, 256801 (2007); *Eur.Phys.J.Special Topics* 148, 63 (2007); *Phys.Rev.B* 77, 195430 (2008); A. Schuessler, P.M. Ostrovsky, I.V. Gornyi, and A.D. Mirlin, arXiv:0809.3782.

Wednesday, 10<sup>th</sup> December 08, 10:45 h, Room 348 / 349, Theresienstr. 37 / III