

### Prize Talk

PV VIII Wed 13:00 H1

**Epitaxial graphene: a new electronic material** — ●THOMAS SEYLLER — FAU Erlangen-Nürnberg — Träger des Walter-Schottky-Preises

The discovery of graphene, a two-dimensional,  $sp^2$ -bonded honeycomb lattice of carbon atoms, has created an enormous interest in its properties, fabrication, and application. Due to its peculiar band structure, charge carriers in graphene are described by the Weyl-Hamiltonian for massless, relativistic Fermions. Extraordinary transport properties such as an unusual quantum Hall effect were observed with graphene samples obtained by mechanical exfoliation. A large mobility of charge carriers and prospects for room-temperature ballistic transport raise hopes for application of graphene in electronic devices. Applications,

however, demand growth methods suitable for producing graphene layers on a wafer scale. While this goal is impossible to reach with exfoliation, epitaxial graphene (EG) grown on the basal plane surfaces of silicon carbide (SiC) offers a much better prospective. In this talk I shall review studies of the structural, electronic, and transport properties of EG grown on SiC by solid-state decomposition at elevated temperatures. The first part describes a study of the electronic structure and structural properties of EG which can conveniently be determined using surface science techniques. In the second part I demonstrate how the growth of EG is improved by going from the traditional growth environment, namely ultrahigh vacuum, to an Argon atmosphere. The latter method leads to vastly improved EG films with properties similar to those of exfoliated graphene. Finally I shall report on ongoing work related to the development of graphene transistors.