Brandenburgische Technische Universität Cottbus - Senftenberg

Fakultät 1, Institut für Physik
Prof. Flege

Invitation to attend »Physics Colloquium«

Prof. Dr. Ulrich Starke
Max Planck Institute for Solid State Research

"Proximity coupling in epitaxial graphene on SiC(0001) by intercalation and nanostructuring"

Epitaxial graphene (EG) grown on Silicon Carbide (SiC) is a suitable candidate for carbon based electronics. Intercalation under the first carbon layer, the so-called zero-layer, relieves its covalent bonds to the SiC(0001) substrate and the typical Dirac-like π-band structure of graphene develops, while it's doping can be manipulated in many aspects. By intercalating rare earth elements, high doping levels can be reached, so that the π*-band's saddle point at the M-point reaches the Fermi level. An extended Van-Hove singularity (VHS) develops due to a strong band renormalization which potentially gives access to unconventional superconductivity.
The intercalated layer itself can be precisely defined which yields a highly ordered graphene/intercalant/substrate system. A sharp two-dimensional (2D) band structure can be resolved for the interface layer. Ag 2D-layers turn out to be semiconducting, accompanied by a noticeable n-doping of the graphene. In contrast, Pb leads to an essentially charge neutral quasi-free graphene layer, while the Pb interlayer develops a helical spin texture in momentum space. Finally, on a SiC surface patterned into mesas and trenches, EG nanoribbons (GNRs) can be grown on the connecting facets that demonstrate a true 1-dimensional electronic behaviour, while on the mesas, a conventional graphene buffer layer develops. By H-intercalation, both graphene types, on mesa and facet, are decoupled and transform into a single, two-dimensional graphene sheet rolling over the mesa structures, however with different types of charge carriers (n and p) on facet and mesa. Thus, a regular array of graphene pn-junctions can be fabricated.

Date: Thursday, 19.11.2026
Time: 03:30 p.m.
Location: ZHG, room SR1