# Seminar announcement

**Tuesday, July 15, 2025**
**1:30 pm**
**WSI, Seminar room S 101**
**Exclusively in person**

# "Intercalation of monolayer Ag within epitaxial Graphene/SiC interface"

Quantum-confined two-dimensional (2D) materials have attracted significant attention due to their potential in nanoscale quantum devices, as their surface electronic properties differ markedly from those of their bulk counterparts. Intercalating 2D materials at the epitaxial graphene (EG)/SiC interface serves as an effective method for inducing quantum confinement while also enhancing environmental stability [1]. This stability allows for the use of various ex-situ characterization techniques. In this work, we investigate silver (Ag) intercalation at the graphene/SiC interface and identify two distinct structural phases: Ag1 and Ag2. High-resolution data obtained from Raman spectroscopy [2], low-energy electron diffraction (LEED), and angle-resolved photoemission spectroscopy (ARPES) reveal significant differences between these two phases. Typically, Ag atoms intercalated at the Gr/SiC interface adopt a triangular lattice arrangement in a 1:1 configuration (referred to as Ag1) [3]. This Ag1 monolayer (ML) exhibits a semiconducting electronic structure, in contrast to the metallic nature of bulk Ag [4]. Interestingly, under defect-mediated intercalation conditions, a denser Ag phase—Ag2—can form. This phase is characterized by a 27/25 Ag packing ratio relative to the underlying Si layer. The electronic structure of Ag2 is more complex than that of Ag1, with observable band splitting along high-symmetry directions. Furthermore, ARPES data reveal enhanced n-type doping of the graphene Dirac cone in Ag2 samples, suggesting a greater degree of charge transfer from the Ag2 layer to graphene. In summary, this study emphasizes phase-selective intercalation strategies for Ag at the Gr/SiC interface. A fundamental understanding of the band structures associated with each phase provides critical insights into their origin and electronic behavior.

[1] S. Hayashi *et al*. Applied Physics Express 11, 015202 (2017).
[2] M. T. Wetherington *et al*. 2D Materials 8, 041003 (2021).
[3] P. Rosenzweig, U. Strake, Phys. Rev. B, 101, 201407(R) (2020).
[4] P. Rosenzweig, *et al*. Phys. Rev. B 105, 235428 (2022).

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