



PHYSIKALISCHES KOLLOQUIUM

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Montag, 07.01.2019, 12 Uhr c.t. **HZO 20**

Hybrid van der Waals Hetero-Structures in the Quantum Limit

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The phenomenal improvement in the nano-assembly of vertical van der Waals heterostructures from twodimensional materials such as graphene, transitional metal dichalcogenides (TMDC), complex oxides etc. allows for a sheer infinite combination of exotic material properties. Enabled by the ultra-clean and atomically sharp interfaces between the parent materials one can engineer novel complex electronic phases with a dramatically restricted phase space and strong electronic interactions, so enabling enhanced quantum effects and electronic correlations with an immense level of tunability. In this talk we will discuss several recent transport, optical and thermal studies on graphene based vdW heterostructures. We will start with a detailed study of the superconducting proximity effect between vdW coupled graphene and the superconductor NbSe₂. Here we demonstrate two long-standing, but not yet observed predictions – the so called specular Andreev reflections at ultra-low Fermi energies, and crossed-Andreev reflections at the Quantum Hall edge at high magnetic fields. We then move on to discuss our novel approach to measure the record low electronic thermal conductivity G_{th} and heat capacity C_e in ultra-clean encapsulated boron nitride/graphene stacks, using optical excitation and a mK sensitive Johnson noise thermometer. At last we combine the two above device concepts to demonstrate the first working graphene single photon detector.

Einführung: Prof. Dr. I. Eremin

Die Fakultät lädt alle Interessierten herzlich ein.