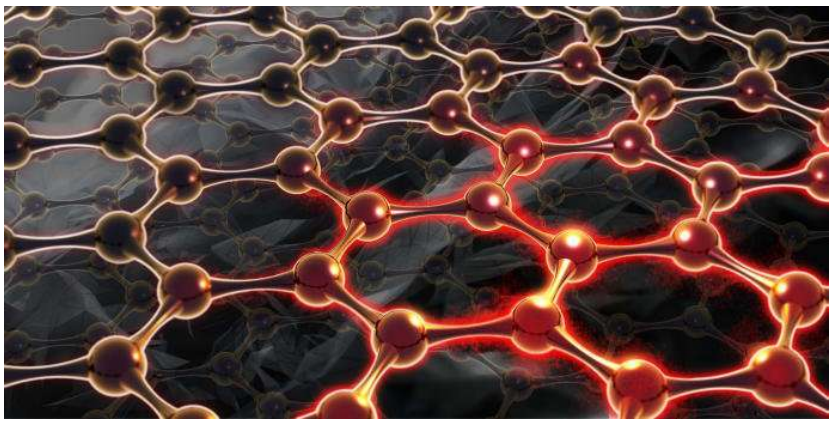
PhD thesis position on Heat transport in graphene-based quantum nanoelectronic devices



Funded joint Karlsruhe-Grenoble double PhD degree.

Motivation: Very low temperature quantum nanoelectronic devices are at the heart of the current quantum revolution, which is destined to produce very innovative concepts in terms of sensors and information processing in the next decades.
Aim: Graphene is a two-dimensional electronic material with extraordinary conduction properties. This project proposes to measure the yet unexplored thermal properties of graphen-based quantum nanodevices, such as thermal conductance, thermoelectricity, and dissipation. We will focus on ballistic conduction effects, including p-n junctions and the Klein paradox, quantum conduction channels, quantum confinement effects (with Coulomb interaction) as well as Aharonov-Bohm type interference effects.
Task: You will deal with the development of new electronic devices using (bilayer) graphene-hBN heterostructures as a base material and the investigations of their fundamental physical properties at low magnetic fields. You will implement local electronic temperature probes in the graphene devices. You will interpret the data together with theorists. You will learn the use of the extensive nanostructuring facilities and cryogenic equipments both at KIT and CNRS Grenoble.
Interested?: Highly motivated candidates can send their application (CV, full academic transcript) to clemens.winkelmann@neel.cnrs.fr and romain.danneau@kit.edu. Knowledge in solid state physics, quantum mechanics and/or computing is beneficial. Good communication skills in English are required.

References: Kraft *et al.*, Nature Commun. 8, 1722 (2018), Phys. Rev. Lett. 121, 257703 (2018), Phys. Rev. Lett 125, 217701 (2020); Dutta *et al.*, Phys. Rev. Lett. 119, 077701 (2017), Nano Lett. 19, 506 (2019), Phys. Rev. Lett. 125, 237701 (2020); Majidi *et al.*, Nano Lett. 22, 630 (2022). Gall *et al.*, Phys. Rev. Res. 4, 023142 (2022).