CARL VON OSSIETZKY universität OLDENBURG
FAKULTÄT V
MATHEMATIK UND NATURWISSENSCHAFTEN

Institut für Physik

Theoriekolloquium

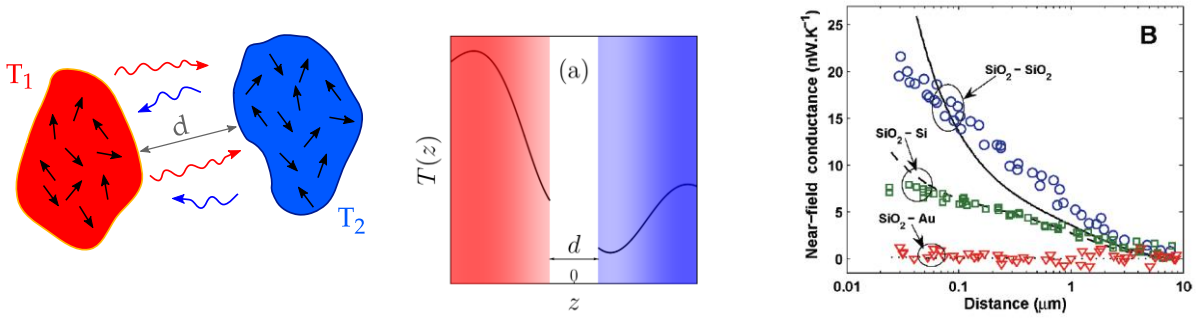
Am **29. Juni 2017** um **14.15 Uhr** in **W2 1-143** hält

Herr Dr. Riccardo Messina (Montpellier)

einen Vortrag mit dem Titel

Near-field radiative heat transfer under temperature gradients and coupling with conductive transfer

Two bodies held at different temperatures exchange heat in the form of thermal photons. In 1971, Polder and van Hove showed that Stefan-Boltzmann's law, setting a theoretical bound on the flux at large distances (defining a black body), is no longer valid in the near field (when the distance separating two bodies is small compared to the thermal wavelength, of several microns at ambient temperature). In this regime, the flux was shown to exceed (even by several orders of magnitude) the far-field limit, especially in materials that support surface modes, i.e. plasmons in metals and phonon-polaritons in dielectrics, diverging quadratically as the distance goes to zero. These important predictions have been recently confirmed by several experiments, which have measured heat exchange all the way down to nanometer scales. Some of these experiments have set forth questions regarding the validity of the divergence, observing instead a saturating flux at nanometric distances. So far, there have been surprisingly no sound theoretical explanations of this phenomenon.



We recently addressed a topic that has remained so far barely unexplored, namely the coupling between radiative heat transfer and conduction. To this aim, we first derived a closed-form analytical expression of the flux between two planar bodies subject to temperature gradients. We showed that the presence of such gradients in planar systems can be exploited to strongly manipulate RHT in this class of geometries, modifying its asymptotic behavior and even changing its sign. Second, we showed that the conduction-radiation coupling can produce strong temperature gradients within each body, resulting in a saturation of the flux at short distances that could potentially explain recent deviations observed in recent experiments.

Interessierte sind herzlich eingeladen.
gez. PD Dr. Svend-Age Biehs