

Abstract Submitted
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QED Kapitza conductance of nano-carbon thermal interconnects¹

SLAVA V. ROTKIN, Physics Department, Lehigh University, ALEXEY G. PETROV, Ioffe Institute — The theory for the near-field Kapitza conductance across the interface of a nano-carbon material and the quartz is thoroughly investigated. The near-field photon tunneling is shown to contribute to the total heat flux between the hot and cold sides of the interface on the order of or even larger than the normal thermal conductance. Quartz is chosen as the most common example of non-conductive and strongly polar substrate material with the well known polarization properties, though the theory is not restricted to quartz only. Our approach allowed us to derive a unified expression for QED Kapitza conductance of the nanocarbon thermal interconnect material, such as graphene, a nanotube, or a nanotube forest and predict thermal phenomena, such as the heat rectification, as a function of the materials properties of the interface.

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