



FWF SFB INFRARED OPTICAL NANOSTRUCTURES

IR-ON Seminar

Dimensionality dependence of the energy relaxation in quantum heterostructures

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Seminarraum Institut für Photonik, Gußhausstrasse 27, 1040 Wien, Raum CBEG02

Within the Fermi Golden Rule approach, it was foreseen long ago that the reduction in phase space would change the interaction between the electrons and the phonons (phonon bottleneck) just because the density of final states would be modified by the size quantization.

But it turns out that the reduction can be so drastic that the very nature of the electron – phonon interaction becomes qualitatively different from what it used to be in bulk or Quantum Well structures. This “strong coupling” regime between electrons and LO phonons leads to the formation of mixed elementary excitations, the polarons.

As shown recently [1], the polaron picture allows a quantitative understanding of the energy relaxation in Quantum Dots with energy spacing ranging from a few meV's to 60 meV's.

The case of Landau quantized electrons will also be discussed. We shall show that efficient static scatterers can destroy the magneto – polarons; however not to the point that the Fermi Golden Rule would again be valid.

E. Zibik et al. Nature Materials (august 2009)



Host: K. Unterrainer

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