Universität Basel

Research Project

Phonon Interference in nanostructures

Third-party funded project

Project title Phonon Interference in nanostructures
Principal Investigator(s) Zardo, Ilaria ;
Organisation / Research unit
Departement Physik / Experimental Material Physics (Zardo)
Department
Project start 01.04.2019
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Status Completed

The objective of this proposal is the realization of interference experiments with phonons, reaching the same level of complexity that can be achieved with electrons and photons. The investigation of phonon interference and different phonon transport regimes is of fundamental interest and is crucial for the manipulation of phonons. Therefore, we aim at exploring:ă

* Phonon interference in nanowire superlattices (**Project A**)ă

* Phonon transport in nanowire junctions (**Project B**)ă

We propose to use nanowires as the platform for investigating and designing the phonon interference effects because they offer unique possibilities in terms of heterostructuring (*i.e.* combining materials that cannot be joined in 2D because of lattice mismatch and realizing crystal phase superlattices) and they enable the growth of high quality nanowire junctions or networks.ă

Phonon interference will be probed by means of inelastic light scattering and thermal transport experiments on nanowire superlattices and nanowire junctions. The complexity and diversity of the envisioned experiments, which are key for the success of the proposed research project, requires the broad experimental spectrum and technological expertise acquired by the applicant and available in the Nanophononics Group.ă

This project will strengthen the understanding of the physics of phonons. Furthermore, since phonons are responsible of heat transport, this project will also have an impact on thermal management at the nanoscale.

The main applicant, Prof. Dr. Ilaria Zardo, has recently been appointed in September 2015 tenure-track assistant professor in the Department of Physics at the University of Basel, where she is leading the Nanophononics group. In 2017 she was awarded an ERC Starting Grant by the European Research Council. She received in 2015 the Hertha-Sponer Prize, awarded to a female scientist for outstanding scientific work in the field of physics. In 2014 she successfully applied with the project “NEW: Nanostructures for Energetic Wisdom” to the Innovational Research Incentives Scheme Veni, which is a prestigious Talent Scheme of the Netherlands Organization for Scientific Research (NWO), meant for talented, creative researchers who are starting their own line of research. She has 10 years’ experience in nanowire growth, spectroscopy on single nanostructures, with focus on inelastic light scattering experiments, and investigation of thermoelectric properties of semiconductor nanowires, expertise acquired in the Technische Universität München and the Technical University of Eindhoven.ă

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Follow-up project of 3490237 Nanophononics: Phonon transport and interference in nanostructures

Add publication

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