



*Im Rahmen des Physikkolloquiums spricht*

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über

## **Nanophononics: Phonon Engineering and Manipulation**

### **Abstract:**

In the last decades, the power to control photons and electrons paved the way for extraordinary technological developments in electronic and optoelectronic applications. A similar degree of control is still lacking with quantized lattice vibrations, i.e. phonons.

The manipulation of phonons is a challenging objective, which holds the promise of a step forward in the exploitation of quantum physics and corresponds to the manipulation of sound and heat.

Furthermore, the understanding and ability to manipulate phonons as quantum particles in solids enable the control of coherent phonon transport, which is of fundamental interest and could also be exploited in applications. Besides being interesting as quantum states themselves, phonons play a crucial role in solid-state physics also in the interaction with electrons and photons.

The recently growing research field called "phononics" deals with the investigation and control of vibrations in solids or liquids, with great potential also for new technological applications. Phonon engineering leads to a controlled modification of phonon dispersion, phonon interactions, and transport. Nonetheless, it requires new theoretical and experimental methods, especially when combined with low dimensional physics, which is one of the most promising routes for thermal management.

In this Colloquium, I will discuss the recent progresses in the field of Nanophononics with particular focus in thermal management and coherent phonon transport regime.