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Institut für Physik
Physikalisches Kolloquium



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Donnerstag, 26.11.2026, 15:30 Uhr

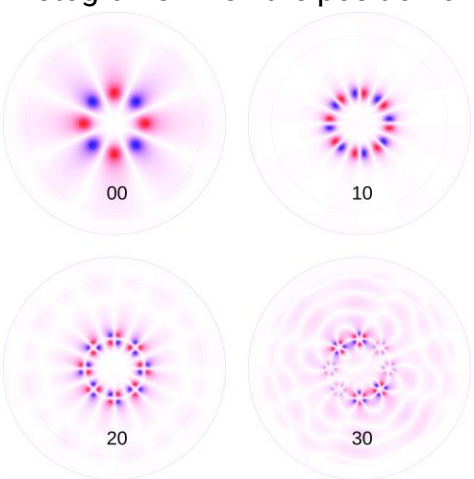
Ort: Reichenhainer Str. 90;
Zentrales Hörsaal- und Seminargebäude, Raum C10.013

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Phononics without walls: exploring the quasi normal modes of resonators and waveguides

Phononics is the science of engineering structures that can tailor the propagation of sound in solids and fluids. It encompasses acoustic metamaterials and artificial crystals for elastic waves. As an introduction to the field, I will first illustrate some current research directions in phononics and especially the problem of maximizing the width of frequency band gaps though the design of the primitive unit cell of artificial crystals [1,2]. I will then turn to the consideration the existence of modes of resonators and waveguides that do not radiate energy, even though they are not contained by enclosing walls. The so-called bound states in the continuum (BICs) are solutions of the harmonic wave equation that do not radiate energy at infinity; they are a limiting case of quasi-normal modes (QNMs) of open systems that possess a finite quality factor and a complex-valued eigenfrequency [3,4]. Since BICs are uncoupled from radiated waves, they are by principle insensitive to the external boundary condition closing the computation domain and this property can be used to explore their existence. Comparison with QNM analysis is conducted by forming spectral histograms when the position of the external boundary is varied [5].



[1] David Röhlig, Angela Thränhardt, Vincent Laude, Thomas Blaudeck, ``Giant band gaps in a phononic crystal with touching solid inclusions," Phys. Rev. Appl. **23** (5), 054055 (2025). https://doi.org/10.1103/PhysRevApplied.23.054055
[2} David Röhlig, Ralf Zichner, Thomas Blaudeck, Angela Thränhardt, and Vincent Laude, "Contact points open wide band gaps in all two-dimensional Bravais lattices," Phys. Rev. B **113**, 144319 (2026). https://doi.org/10.1103/9ql7-t9rh
[3] Vincent Laude and Yan-Feng Wang, Quasinormal mode representation of radiating resonators in open phononic systems" Phys. Rev. B 107, 144301 (2023). https://doi.org/10.1103/PhysRevB.107.14430
[4] Vincent Laude, ``Complex dispersion relation of Rayleigh-Bloch waves trapped by slow inclusions, " Phys. Rev. B **111** (22), L220101 (2025). https://doi.org/10.1103/195c-gy6f
[5] Vincent Laude and David Röhlig, "Identifying bound states in the continuum by their boundary sensitivity, " Phys. Rev. Appl. **25**, 044086 (2026). https://doi.org/10.1103/998l-j9cc

Alle Zuhörer sind ab 15:15 Uhr zum Kaffee vor dem Hörsaal eingeladen.

Informationen zum Vortrag erteilt:
Prof. Dr. Ulrich T. Schwarz, Tel.: 531 30001

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