



# PHYSIKALISCHES KOLLOQUIUM

des Fachbereichs Physik  
der Johann Wolfgang Goethe-Universität Frankfurt

Mittwoch, den 18.10.2017, 16 Uhr c.t.  
Großer Hörsaal, Raum \_0.111,  
Max-von-Laue-Str. 1



## Prof. Dr. Ronny Thomale

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Lehrstuhl Theoretische Physik I

### *"Topoelectrical circuits"*

First developed by Alessandro Volta and Felix Savary in the early 19th century, circuits consisting of resistor, inductor and capacitor (RLC) components are now omnipresent in modern technology. The behavior of an RLC circuit is governed by its circuit Laplacian, which is analogous to the Hamiltonian describing the energetics of a physical system. We show that "topoelectrical" boundary resonances (TBRs) appear in the impedance read-out of a circuit whenever its Laplacian bandstructure resembles that of topological semimetals - materials with extensive degenerate edge modes known as Fermi arcs that also harbor enigmatic transport properties. Due to the versatility of electronic circuits, our topological semimetal construction can be generalized to topoelectrical phases with any desired lattice symmetry, spatial dimension, and even quasiperiodicity. Topoelectrical circuits establish a bridge between electrical engineering and topological states of matter, where the accessibility, scalability, and operability of electronics promises to synergize with the intricate boundary properties of topological phases.

Die Dozenten der Physik

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