

Physikalisches Kolloquium
Einladung**Physics Colloquium**
Invitation**Monday, 11 January 2027**

Lecture Hall O25/H2, at 16:15

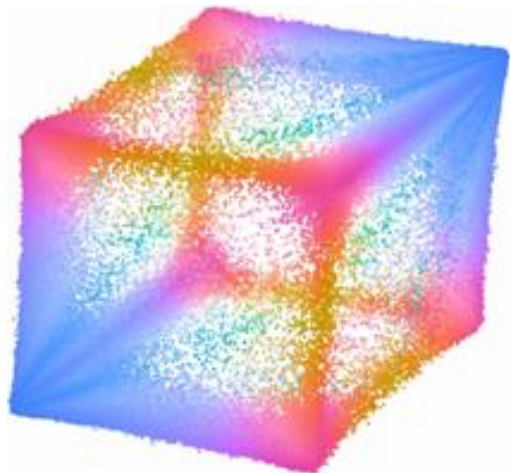
Coffee and cookies will be served in front of the lecture hall from 16:00

Phase Logic with Nonlinear Systems**PD Dr. Alexander Eichler**

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<https://www.phys.ethz.ch/de/das-departement/personen/person-detail.alexander-eichler.html>

Driven nonlinear systems offer a platform to study out-of-equilibrium physics and, surprisingly, to emulate equilibrium physics. A particularly fascinating example is the parametric oscillator, a resonator that can oscillate in one of two states with opposite phase. These states can encode bits and thus enable logic operations. In particular, networks of parametric oscillators can be harnessed for so-called “Ising machines”, which find the ground state of an Ising Hamiltonian, a model of interacting spins, by reading out the collective pattern of oscillation phases. In this talk, I will show that parametric oscillators can be experimentally realized with nanomechanical or electrical resonators, and how several resonators can be coupled to create small networks. I will furthermore demonstrate how such a network can be tuned into a regime where it simulates an Ising Hamiltonian, and how it can reproduce the Boltzmann statistics of such a Hamiltonian at finite temperature. At the same time, the physics we observe in such networks is very rich and goes far beyond the Boltzmann distribution. I will present recent results on coexisting dynamical states that evolve in time rather than forming static phase patterns, and that might allow designing neural networks that operate beyond equilibrium.



Host: Prof. Dr. Benjamin Stickler, Institute of Complex Quantum Systems

Organisation: Prof. Dr. Johannes Hecker Denschlag, Institute of Quantum Matter,
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