

PHYSIKALISCHES KOLLOQUIUM

Wintersemester 2025/2026

Das Kolloquium findet (soweit nicht anders angegeben) **jeweils montags um 14:15 Uhr im Röntgen-Hörsaal** des Physikalischen Instituts, Hubland Campus Süd, Universität Würzburg **und online via Zoom** statt.

Zugangsdaten siehe <https://www.physik.uni-wuerzburg.de/aktuelles/veranstaltungen-aus-der-physik/physikalisches-kolloquium/>

17.11.2025

Prof. Dr. Florian Marquardt
Max-Planck-Institut für die Physik des Lichts, Erlangen

Making physical machines learn

Abstract

The ongoing revolution in artificial intelligence requires ever-increasing resources for training and deploying artificial neural networks. This exponentially accelerating trend has been recognized as unsustainable, and a community of scientists and engineers are exploring energy-efficient alternatives to the current paradigm of digital artificial neural networks. By designing devices that operate much closer to the microscopic laws of physics but offer similar functionalities, one can achieve significant gains in efficiency and speed. In this talk, I will give an overview of the different approaches. Above all, I will concentrate on the topic of physics-based learning, where the idea is to extract the correct updates to trainable parameters in an efficient manner, based on intelligently chosen experimental procedures. I will illustrate the opportunities in this domain by a few of our recent ideas. These include learning with the help of time-reversal operations, nonlinear processing based on linear optical scattering, and a new training technique that will help to turn any analog quantum simulator platform into a trainable neuromorphic device.

Für die Dozentinnen bzw. Dozenten der Fakultät

Prof. Dr. Palffy-Buß, Prof. Dr. Klembt, Dr. Hammer, Hr. Baumbach, Fr. Schleicher