Donnerstag
02.05 um 16 Uhr
Studentinnen/Studenten
sind herzlich willkommen

Kathy Lüdge

Theoretische Physik 2
Technische Universität Ilmenau

"Photonic Reservoir Computing"

Thursday, May 2nd, 2024, at 4.00 p.m. c.t.
Building C6.4, Lecture Hall II

Optical cavities with nonlinear elements and delayed self-coupling are widely explored candidates for photonic reservoir computing (RC). The latter is a machine learning scheme where only one linear regression step at the readout layer is needed while the reservoir itself remains unchanged. RC can thus be easily implemented in various hardware systems. It is especially suited for solving complex time-series prediction tasks due to the memory provided by the finite internal timescales of the dynamical system used as the reservoir. The specific RC prediction performance, however, critically depends on the nonlinear system response to the external perturbation by the data and on the specific memory requirements of the chosen task. In this talk, I will present ways to improve the performance of delay-based RC systems via timescale tuning and bifurcation analysis. I will also discuss possibilities for external memory augmentation via additional delays, which can greatly improve the performance and reduce the parameter dependencies of the RC system.
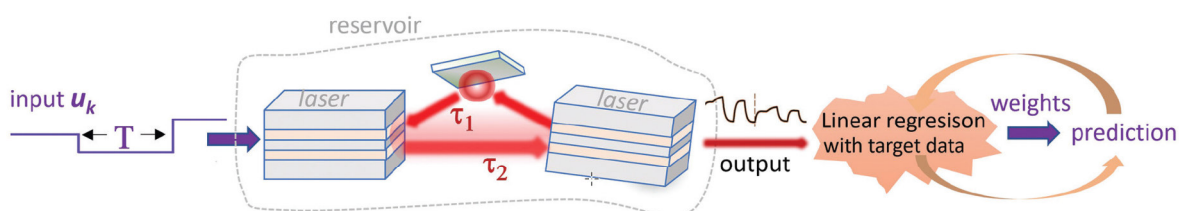
Figure 1: Photonic delay-based RC setup consisting of two lasers coupled with delays τ_1 and τ_2. The inputs u_k are fed into the laser, each for one clock-cycle T. The target (task) is a future step of the input time series and the prediction is calculated by multiplying the sampled laser output with the weights that are determined during training via linear regression.

PD Philipp Hövel takes care of the speaker.
You can participate online via TEAMS: https://tinyurl.com/Luedge0205

Interested people are cordially invited.

Coffee and cookies are served at 4.00 p.m. in front of the Lecture Hall

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