Universität Bielefeld Fakultät für Physik

Seminar

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Machine learning as a physical observable: Renormalization, symmetry breaking and histogram reweighting

A physical interpretation of machine learning functions is presented that enables efficient studies of phase transitions. In particular, the predictive function of a neural network, designed for phase classification, is treated as a physical observable with an associated Boltzmann weight. This allows its extrapolation in parameter space with histogram reweighting techniques. We further include the predictive function in the Hamiltonian as a conjugate variable coupled to an external field to control properties of the statistical system, specifically to induce symmetry breaking or symmetry restoration. Accurate calculations of the critical exponents and the critical temperature of the two-dimensional Ising model are presented using finite size scaling and the renormalization group on quantities derived entirely from the neural network.

Tuesday, 12.01.2021, 14:15 Uhr
Ort: Cyberspace