Mathematical Physics
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I N V I T A T I O N

as part of the Mathematical Physics Theory Seminar

to the online talk by

Nabil IQBAL

(Durham University)

on

"Machine learning approach to duality in statistical physics"

Abstract:

A duality arises when a given physical system has two different mathematical representations. In this talk I will discuss the possibility of using modern machine learning methods to find dualities in statistical physics. Establishing a duality in lattice statistical mechanics models requires the construction of a dual Hamiltonian and a map from the original to the dual observables. By using simple neural networks to parameterize these maps and introducing a loss function that penalises the difference between correlation functions in original and dual models, the process of duality discovery can be formulated as an optimization problem.
I will introduce the required concepts from machine learning and show how to solve this problem numerically for the 2d Ising model and some variants. I will also discuss the prospects of finding new dualities using such methods.

Time: Tuesday, 7 January 2025, 2:00 p.m.

Location: Erwin-Schrödinger Lecture Hall, 1090 Vienna, Boltzmanngasse 5, 5th floor

sgd. S. Fredenhagen, M. Sperling