universität innsbruck

Department of Theoretical Physics

# Seminar Talk

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"Interpretable and reliable machine learning for quantum physics"

Abstract

Quantum many-body physics is rich in challenges such as understanding and designing novel phases of matter, finding ground states of large systems with complex interactions, or improving quantum simulating and computing platforms. A new-data driven paradigm of machine learning is rising, promising breakthroughs in every listed domain. While delivering impressive results in real-world applications, the black-box construction of neural networks often hinders their effectiveness in scientific research. As a result, within my research, I focus on interpretable and reliable machine learning to help in scientific discovery. In particular, I will present our efforts in interpretable machine learning of phases of matter and their order parameters using custom-made methods. To show another side of automated discovery, I will also discuss a graph search algorithm that we designed to locate laser cooling schemes out of spectroscopic data. I will conclude by discussing the (numerous!) exciting open problems of the field.

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