



## PHYSIKALISCHES KOLLOQUIUM

*Referent:* **Prof. Dr. Simon Trebst**  
University of Cologne



*Thema:* **Quantum Machine Learning**

*Zeit und Ort:* Dienstag, 30.1.2018, 16:40 Uhr  
Recknagel-Bau, Hörsaal REC/C213, Haeckelstr. 3

*Leiter:* Prof. Dr. Carsten Timm

*Kurzfassung:* Machine learning techniques have become ubiquitous electronic helpmates in our daily life. This includes pattern recognition technologies that have long filtered data in electronic mailboxes and have more recently become powerful enough to identify users by the touch of a button or the scan of a face. In this colloquium, I will briefly review the algorithmic foundations of these machine learning approaches and then turn to their application in the context of statistical physics problems. I will demonstrate that machine learning techniques are capable to discriminate phases of matter by extracting essential features in the many-body wavefunction or the ensemble of correlators sampled for instance in Monte Carlo simulations. Of particular interest are quantum many-fermion problems that have long resisted a thorough numerical understanding — will we be able to guide our understanding of the emergence of superconductivity or topological order in such systems using machine learning approaches?

*Biographie:* Simon Trebst is a full professor of theoretical physics at the University of Cologne where he leads a group studying collective phenomena in quantum many-body systems. Before joining the Institute for Theoretical Physics in 2012, Dr. Trebst worked at Microsoft Research Station Q in Santa Barbara where he explored the theoretical foundations of a topological quantum computer. Dr. Trebst received his PhD at the University of Bonn in 2002 and did postdoctoral work at ETH Zurich.

Mitglied von:



**DRESDEN  
concept**  
Exzellenz aus  
Wissenschaft  
und Kultur