

PhD Positions in Quantum Physics and Machine Learning

University of Tübingen

We invite applications for up to **three PhD positions** (TV-L E13, 75%, 3 years) within the interdisciplinary research project **EXPRESSO** (*Extracting Probabilistic Representations in Exponential Quantum Spaces*). The aim of the project is to **develop machine learning methods** to tackle the exponential complexity of quantum state, design, and model spaces to fundamentally improve the quality of quantum simulations and quantum hardware design. It is conducted in the framework of the **Cluster of Excellence – Machine Learning for Science** and run jointly by researchers from the Institute for Theoretical Physics, the Computer Science Department, and the AI Center at the University of Tübingen.

The PhD projects are:

- Probabilistic simulation and inference for quantum gases
- Simulation-guided model discovery via adaptive amortized inference
- Representation learning for optimization in exponential search spaces

All projects are tightly integrated and offer supervision across both physics and machine learning. The principal investigators of the EXPRESSO project are

Philipp Hennig (Probabilistic Numerics), philipp.hennig@uni-tuebingen.de

Mario Krenn (Automated Experiment Discovery), mario.krenn@uni-tuebingen.de

Igor Lesanovsky (Quantum Many-Body Physics), igor.lesanovsky@uni-tuebingen.de

Jakob Macke (Simulation-Based Inference), jakob.macke@uni-tuebingen.de

Georg Martius (Optimisation & Representation Learning), georg.martius@uni-tuebingen.de

Candidates should hold a Master's degree in Physics, Computer Science, Mathematics, or a related field, and have strong mathematical foundations and programming skills. Prior experience in quantum mechanics, Bayesian methods, or deep learning is an advantage. Applicants are expected to demonstrate commitment to interdisciplinary and impactful research, including a willingness to build concrete software artifacts.

Applications are reviewed on a rolling basis. Early applications are strongly encouraged. The review period closes on 14 September 2026. Please upload a CV, a short motivation letter and the names of two Referees here <https://forms.gle/JLVdK2Vi8bmmjsu29>. Also indicate your preferred project(s).