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Einladung zum Vortrag

"Quantum algorithms and the prospect of near-term applications on noisy devices"

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Ort: **Internationales Erwin Schrödinger Institut für Mathematik und Physik (ESI), Schrödinger-Hörsaal**

9. Boltzmanngasse

Abstract:

Prospective near-term applications of early quantum devices rely on accurate estimates of expectation values to become relevant. Decoherence and gate errors lead to wrong estimates. This problem was, at least in theory, remedied with the advent of quantum error correction. However, the overhead that is needed to implement a fully fault-tolerant gate set with current codes and current devices seems prohibitively large. In turn, steady progress is made in improving the quality of the quantum hardware, which leads to the belief that in the foreseeable future machines could be built that cannot be emulated by a conventional computer. In light of recent progress mitigating the effect of decoherence on expectation values, it becomes interesting to ask what these noisy devices can be used for. In this talk we will present our advances in finding quantum machine learning applications for noisy quantum computers. We propose, and experimentally implement, two classification algorithms on a superconducting processor. Both methods represent the feature space of the classification problem in terms of quantum states, taking advantage of the large dimensionality of Hilbert space. One method, the quantum variational classifier, operates through using a variational quantum circuit to classify a training set in direct analogy to conventional SVMs. In the second, a quantum kernel estimator, we estimate the kernel function and optimize the classifier directly. The two methods present a new class of tools for exploring the applications of noisy intermediate scale quantum computers to machine learning.

Im Rahmen des Vortrages findet eine Lehrprobe zum Thema

"The concept of information in mathematics and physics" statt.