Quantum computing, Machine Learning and Quantum Machine Learning at UiO

Center for Computing in Science Education and Computational Physics Research Group, Department of Physics, UiO

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People

UiO

1. Morten Hjorth-Jensen (theory), Lasse Vines, Marianne Bathen Etzelmueller, Justin Wells and David Gongarra (experiment)
2. Four theory PhD students (2019-2025), one PD
3. Twelve master of science students (theory), many-body physics, quantum computing, quantum machine learning and machine learning

Machine learning research

1. Solving complicated quantum mechanical many-body systems with deep learning, see https://www.nature.com/articles/s42005-024-01613-w
2. Developing new machine learning algorithms, with applications to quantum computing as well, see https://arxiv.org/abs/2401.11694
3. Analyzing experimental data from physics experiments, see for example https://www.sciencedirect.com/science/article/abs/pii/S0168900221004460?via%3Dihub
4. Predicting solid state material platforms for quantum technologies, see for example https://www.nature.com/articles/s41524-022-00888-3

Many-body physics, Quantum computing and quantum machine learning

1. How to use many-body theory to design quantum circuits and gates (Quantum engineering), see for example https://arxiv.org/abs/2401.11694
2. Many-body theory with focus on
   - Adaptive basis sets
   - Time dependence
   - Feedback from experiment
3. Studies of many-body entanglement and quantum tomography
4. Numerical experiments to mimick real systems, quantum twins
5. Constructing quantum circuits to simulate specific systems
6. Quantum machine learning to optimize quantum circuits