

Emerging Opportunities in Quantum Machine Learning & Quantum Algorithms

Report of Contributions

Contribution ID: 2

Type: **not specified**

Opening Remarks

Tuesday, 26 February 2019 13:15 (15 minutes)

Session Classification: Talks

Contribution ID: 3

Type: **not specified**

Quantum Machine Learning: The landscape from an industry perspective.

Tuesday, 26 February 2019 13:30 (45 minutes)

Quantum Machine Learning (QML) is emerging as an application for quantum computers with the potential to be the killer app. With the successful application of machine learning methods in industry applications and the emerging deep learning renaissance it is natural to extrapolate that quantum computers, once fully capable, will play a transformative role in the way we think of computation and communication with learning and automation driven methods at their core. This exploratory talk will briefly introduce the basics of QML and survey the landscape of existing methods. The talk will then showcase a few example quantum machine learning projects done by the INQNET group at the AT&T Foundry, while highlighting how such projects could lead to real world applications in industry. In conclusion the talk will raise some questions on the current status of the field, in the hope of spurring constructive discussion on future progress.

Presenter: PRAVAHAN, Rishiraj (AT&T Foundry)

Session Classification: Talks

Contribution ID: 4

Type: **not specified**

Quantum AI at Fermilab

Tuesday, 26 February 2019 14:15 (45 minutes)

Machine learning has the potential to be an important early application area for quantum computers. In this presentation I will discuss the Quantum Science Program at Fermilab at a high level, and then zoom in on a pair of recently awarded DOE grants that include machine learning applications as part of their portfolios. I will discuss the applications we're exploring and chart a course for some NISQ-era projects in the space.

Presenter: PERDUE, Gabriel (Fermilab)

Session Classification: Talks

Contribution ID: 5

Type: **not specified**

Quantum Algorithms for Quantum Field Theory

Tuesday, 26 February 2019 15:30 (45 minutes)

Inherently quantum calculators may be able to empower quantum field theory calculations. After discussing existing results for scattering amplitudes and lattice methods, I will motivate a new direction where interference and entanglement effects are largely ignored in current high energy simulations.

Presenter: NACHMAN, Ben (LBNL)

Session Classification: Talks

Contribution ID: 6

Type: **not specified**

Quantum Machine Learning:Use Cases, Challenges, and Potential

Tuesday, 26 February 2019 16:15 (45 minutes)

We survey the field of quantum machine learning, in particular the algorithmic tools which are used in modern quantum ML algorithms. We review both heuristic approaches, such as quantum neural and tensor networks, as well as provable approaches based on the HHL algorithm and quantum linear algebra. We also discuss the varying applications, and amenability to near-term quantum computers.

Presenters: BOULAND, Adam (QCWare); COUDRON, Matthew (QCWare)

Session Classification: Talks