Quantum Techniques in Machine Learning (QTML conference 2023)

Report of Contributions

https://indico.cern.ch/e/1288979

Contribution ID: **3** Type: **not specified**

OPENING

Monday 20 November 2023 08:45 (15 minutes)

OPENING
Speaker: Michele Grossi & Alberto Di Meglio

Presenters: DI MEGLIO, Alberto (CERN); Dr GROSSI, Michele (CERN)

Contribution ID: **4** Type: **not specified**

KEYNOTE: A General Message Belief Propagation Framework for Quantum Computations

Monday 20 November 2023 09:00 (1 hour)

The core computational tasks in quantum systems are the computation of expectations of operators, including reduced density matrices, and the computation of the ground state energy of a quantum system. Many tools have been developed in the literature to achieve this, including Density Functional Theory (DFT), Density Matrix Renormalization Group (DMRG) and other Tensor Network methods, Variational Monte Carlo (VMC) and so on. Recently, some methods based on Machine Learning have also been pioneered such as FermiNet and PauliNet and other Neural Variational methods. In this work we will build a bridge between the rich Machine Learning literature on Loopy Belief Propagation and its generalizations for posterior inference and the above mentioned quantum computational tasks. It was shown recently that LBP can be used to contract Tensor Networks and compute Reduced Density Matrices. Here we generalize this concept to a new class of generalized LBP methods, known as Region Graph BP and as a particular example we implemented TreeEP. We show that a very general framework exists that encompasses both classical LBP and quantum LBP, which can be used to compute expectations as well as ground state energies and states. We hope that this work will encourage cross fertilization between these two fields.

Joint work with:
Evgenii Egorov
Antonio Rotundo
Ido Niesen
Roberto Bondesan

Presenter: Prof. WELLING, Max (University of Amsterdam)

Contribution ID: **5** Type: **not specified**

INVITED TALK: Better than classical? The subtle art of benchmarking quantum models

Monday 20 November 2023 10:00 (45 minutes)

Abstract: There is no shortage of quantum machine learning papers observing that a particular quantum model "beats its classical counterparts on real-world datasets". However, the subtlety of choices made in benchmark experiments, the small scale of the models and data, as well as narratives influenced by the commercialisation of quantum technologies carry the danger of a strong positivity bias. To judge the true potential of prominent ideas in quantum machine learning we are conducting one of the first large-scale meta-studies that systematically tests 12 popular supervised quantum models at scale using the PennyLane software framework. This talk gives a sneak peek of some surprising preliminary results, and reveals the technical and conceptual difficulty of robust benchmarking, a skill which deserves more attention in the quantum applications literature.

Presenter: Dr KILLORAN, Nathan (Xanadu)

Contribution ID: **6** Type: **not specified**

INVITED TALK: The signal and the noise: learning with random quantum circuits and other agents of chaos

Friday 24 November 2023 09:00 (30 minutes)

What can we quantum-learn in the age of noisy quantum computation? Both more and less than you think. Noise limits our ability to error-mitigate, a term that refers to near-term schemes where errors that arise in a quantum computation are dealt with in classical pre-processing. I present a unifying framework for error mitigation and an analysis that strongly limits the degree to which quantum noise can be effectively 'undone' for larger system sizes, and shows that current error mitigation schemes are more or less as good as they can be. After presenting this negative result, I'll switch to discussing how noise can be a friendly foe: non-unital noise, unlike its unital counterparts, surprisingly results in absence of barren plateaus in quantum machine learning.

Presenter: Dr QUEK, Yihui (Harvard University)

Contribution ID: **8** Type: **not specified**

INVITED TALK: Topics in quantum topological data analysis

Thursday 23 November 2023 11:15 (45 minutes)

Abstract:
Although still a relatively niche field in classical machine learning, topological data analysis has raised substantial interest from the perspective of quantum algorithms in the last few years.
In this talk we will introduce the topic of topological data analysis, and discuss the state-of-art of quantum algorithms for this problem, together with their promises and limitations, possible generalisations and connections to many-body physics.

Presenter: DUNJKO, Vedran (Leiden University)

Contribution ID: **10** Type: **not specified**

Non-IID Quantum Federated Learning with One-shot Communication Complexity

Monday 20 November 2023 14:45 (15 minutes)

Presenter: ZHAO, haimeng (Tsinghua University)

Session Classification: Quantum Models and Data

Contribution ID: **11** Type: **not specified**

Quantum models and data through a precomputation lens

Monday 20 November 2023 15:00 (30 minutes)

Presenter: MCLEAN, Jarrod (Google Quantum AI)

Session Classification: Quantum Models and Data

Contribution ID: **12** Type: **not specified**

Demystify Problem-Dependent Power of Quantum Neural Networks on Multi-Class Classification

Monday 20 November 2023 15:30 (30 minutes)

Presenter: WHA, Xinbiaong (Wuhan University)

Session Classification: Quantum Models and Data

Contribution ID: **13** Type: **not specified**

Transition role of entangled data in quantum machine learning

Monday 20 November 2023 16:00 (30 minutes)

Presenter: WHA, Xinbiaong (Wuhan University)

Session Classification: Generalisation

Contribution ID: **14** Type: **not specified**

The power and limitations of learning quantum dynamics incoherently

Monday 20 November 2023 16:30 (30 minutes)

Presenter: JERBI, Sofiene (Freie Universität Berlin)

Session Classification: Generalisation

Contribution ID: **15** Type: **not specified**

Understanding generalization with quantum geometry

Monday 20 November 2023 17:00 (15 minutes)

Presenter: HAUG, Tobias (TII)

Session Classification: Generalisation

Contribution ID: **16** Type: **not specified**

Understanding quantum machine learning also requires rethinking generalization

Monday 20 November 2023 17:15 (15 minutes)

Presenter: GIL-FUSTER, Elies (reie Universität Berlin, Fraunhofer HHI Berlin)

Session Classification: Generalisation

Contribution ID: **17** Type: **not specified**

Analyzing variational quantum landscapes with information content

Friday 24 November 2023 09:30 (15 minutes)

Presenter: PEREZ SALINAS, Adrian (Lorentz Institute - Leiden University)

Session Classification: Gradients and Landscape Theory

Contribution ID: **18** Type: **not specified**

Training robust quantum classifiers based on Lipschitz bounds

Friday 24 November 2023 10:00 (30 minutes)

Presenter: BERBERICH, Julian (University of Stuttgart)

Session Classification: Gradients and Landscape Theory

Contribution ID: **19** Type: **not specified**

Variational Quantum Time Evolution without the Quantum Geometric Tensor

Wednesday 22 November 2023 15:45 (15 minutes)

Presenter: GACON, Julien (IBM EPFL)

Session Classification: Architecture for QML 3

Contribution ID: **20** Type: **not specified**

On quantum backpropagation, information reuse, and cheating measurement collapse

Monday 20 November 2023 11:15 (45 minutes)

Presenter: ABBAS, Amira (University of Amsterdam/QuSoft)

Session Classification: Quantum Learning and Quantum Advantage

Contribution ID: **21** Type: **not specified**

Here comes the SU(N) multivariate quantum gates and gradients

Tuesday 21 November 2023 16:45 (15 minutes)

Presenter: WIERSEMA, Roeland (University of Waterloo & Vector Institute)

Session Classification: Trainability of Quantum Architectures

Contribution ID: **22** Type: **not specified**

A Topological Features Based Quantum Kernel

Thursday 23 November 2023 12:00 (15 minutes)

Presenter: Mr INCUDINI, Massimiliano (University of Verona)

Session Classification: Quantum Kernels

Contribution ID: **23** Type: **not specified**

Neural Quantum Embedding: Pushing the Limits of Quantum Supervised Learning

Thursday 23 November 2023 13:00 (15 minutes)

Presenter: HUR, Tak (Yonsei University)

Session Classification: Quantum Kernels

Contribution ID: **24** Type: **not specified**

A Multi-Class Quantum Kernel-Based Classifier

Thursday 23 November 2023 12:45 (15 minutes)

Presenter: PILLAY, Shivani (University of KwaZulu Natal)

Session Classification: Quantum Kernels

Contribution ID: **25** Type: **not specified**

Expressivity and Generalization Ability of Trace-induced Quantum Kernels

Thursday 23 November 2023 12:15 (30 minutes)

Presenter: GAN, Beng Yee (Centre for Quantum Technologies)

Session Classification: Quantum Kernels

Contribution ID: **26** Type: **not specified**

Time-series quantum reservoir computing with weak and projective measurements

Tuesday 21 November 2023 09:00 (15 minutes)

Presenter: MUJAL, Pere (ICFO)

Session Classification: Architectures for QML 1

Contribution ID: **27** Type: **not specified**

Next Generation Quantum Reservoir Computing: An Efficient Quantum Algorithm for Forecasting Quantum Dynamics

Friday 24 November 2023 16:00 (15 minutes)

Presenter: THIPARAT, Chotibut (Chulalongkorn University)

Session Classification: Quantum Reservoir Computing

Contribution ID: **28** Type: **not specified**

Hybrid quantum-classical reservoir computing for solving chaotic systems

Friday 24 November 2023 15:45 (15 minutes)

Presenter: WUDRASKI, Filip (USRA)

Session Classification: Quantum Reservoir Computing

Contribution ID: **30** Type: **not specified**

Hierarchical quantum circuit representations for neural architecture search

Tuesday 21 November 2023 09:45 (15 minutes)

Presenter: LOURENS, Matt (Stellenbosch University)

Session Classification: Architectures for QML 1

Contribution ID: **31** Type: **not specified**

Quantum Fourier Networks for Solving Parametric PDEs

Wednesday 22 November 2023 16:30 (30 minutes)

Presenters: LANDMAN, Jonas (University of Edinburgh / QC Ware); MATHUR, Natansh

Session Classification: Architecture for QML 3

Contribution ID: **32** Type: **not specified**

Let Quantum Neural Networks Choose Their Own Frequencies

Tuesday 21 November 2023 09:15 (15 minutes)

Presenter: JADEBERG, Ben (PASQAL)

Session Classification: Architectures for QML 1

Contribution ID: **33** Type: **not specified**

The landscape of QAOA Max-Cut Lie algebras

Friday 24 November 2023 09:45 (15 minutes)

Presenter: LAROCCA, Martin (Los Alamos National Lab)

Session Classification: Gradients and Landscape Theory

Contribution ID: **34** Type: **not specified**

Homogenous space expressibility of parametrized quantum circuits

Tuesday 21 November 2023 13:00 (15 minutes)

Presenter: ARVIND, Rahul (Institute for High Performance Computing, A*STAR)

Session Classification: Symmetry and Geometric QML

Contribution ID: **35** Type: **not specified**

INVITED TALK: A Unified Theory of Barren Plateaus for Deep Parametrized Quantum Circuits

Tuesday 21 November 2023 11:15 (45 minutes)

Abstract: Variational quantum computing schemes have received considerable attention due to their high versatility and potential to make practical use of near-term quantum devices. Despite their promise, the trainability of these algorithms can be hindered by barren plateaus (BPs) induced by the expressiveness of the parametrized quantum circuit, the entanglement of the input data, the locality of the observable or the presence of hardware noise. Up to this point, these sources of BPs have been regarded as independent and have been studied only for specific circuit architectures. In this work, we present a general Lie algebraic theory that provides an exact expression for the variance of the loss function of sufficiently deep parametrized quantum circuits, even in the presence of certain noise models. Our results unify under one single framework all aforementioned sources of BPs by leveraging generalized (and subsystem independent) notions of entanglement and operator locality. Finally, our results lead to a critical question: Does the inherent structure that precludes the presence of BPs in a variational model (a requisite for trainability) simultaneously render it classically simulable?

Presenter: Dr CEREZO, Marco (Los Alamos National Laboratory)

Contribution ID: **36** Type: **not specified**

Symmetry-invariant quantum machine learning force fields

Tuesday 21 November 2023 12:30 (30 minutes)

Presenter: NHA MINH LE, Isabel (IBM Research Europe - Zurich and Technical University of Munich)

Session Classification: Symmetry and Geometric QML

Contribution ID: **37** Type: **not specified**

Equivariant Quantum Models

Tuesday 21 November 2023 12:00 (15 minutes)

Presenter: LAROCCA, Martina (Los Alamos National Laboratory)

Session Classification: Symmetry and Geometric QML

Contribution ID: **38** Type: **not specified**

Approximately Equivariant Quantum Neural Network for p4m Group Symmetries in Images

Tuesday 21 November 2023 12:15 (15 minutes)

Presenter: CHANG, Su Yeon (EPFL - Ecole Polytechnique Federale Lausanne (CH))

Session Classification: Symmetry and Geometric QML

Contribution ID: **39** Type: **not specified**

Splitting and Parallelizing of Quantum Convolutional Neural Networks for Learning Translationally Symmetric Data

Friday 24 November 2023 10:30 (15 minutes)

Presenter: CHINZEI, Koki (Fujitsu Limited)

Session Classification: Gradients and Landscape Theory

Contribution ID: **40** Type: **not specified**

Trainability barriers and opportunities in quantum generative modeling

Tuesday 21 November 2023 14:45 (30 minutes)

Presenter: RUDOLPH, Manuel (EPFL)

Session Classification: Trainability of Quantum Architectures

Contribution ID: **41** Type: **not specified**

On the Absence of Barren Plateaus in Quantum Generative Adversarial Networks

Tuesday 21 November 2023 15:45 (30 minutes)

Presenter: Dr ZOUFAL, Christa (IBM Quantum Europe)

Session Classification: Trainability of Quantum Architectures

Contribution ID: **42** Type: **not specified**

On the Sample Complexity of Quantum Boltzmann Machine Learning

Tuesday 21 November 2023 15:15 (30 minutes)

Presenter: COOPMANS, Luuk (Quantinuum)

Session Classification: Trainability of Quantum Architectures

Contribution ID: **43** Type: **not specified**

Deep quantum neural networks form Gaussian processes

Tuesday 21 November 2023 16:15 (30 minutes)

Presenter: GARCIA-MARTIN, Diego (Los Alamos National Laboratory)

Session Classification: Trainability of Quantum Architectures

Contribution ID: **44** Type: **not specified**

A General Approach for Dropout in Quantum Neural Networks

Tuesday 21 November 2023 10:15 (15 minutes)

Presenter: SCALA, Francesco (Università degli Studi di Pavia)

Session Classification: Architectures for QML 1

Contribution ID: **45** Type: **not specified**

Shadows of quantum machine learning

Wednesday 22 November 2023 09:00 (30 minutes)

Presenter: JERBI, Sofiene (Freie Universität Berlin)

Session Classification: Quantum Learning and Shadows

Contribution ID: **46** Type: **not specified**

Neural–Shadow Quantum State Tomography

Wednesday 22 November 2023 09:45 (30 minutes)

Presenter: RONAGH, Pooya (University of Waterloo & 1QBit)

Session Classification: Quantum Learning and Shadows

Contribution ID: **47** Type: **not specified**

Efficient information recovery from Pauli noise via classical shadow

Wednesday 22 November 2023 10:15 (15 minutes)

Presenter: CHEN, Yifei (Institute for Quantum Computing, Baidu)

Session Classification: Quantum Learning and Shadows

Contribution ID: **48** Type: **not specified**

Post-Variational Quantum Neural Networks

Wednesday 22 November 2023 09:30 (15 minutes)

Presenter: HUANG, Po-wei (Centre for Quantum Technologies)

Session Classification: Quantum Learning and Shadows

Contribution ID: **49** Type: **not specified**

INVITED TALK:

Wednesday 22 November 2023 11:15 (45 minutes)

Presenter: Prof. ARES, Natalia (University of Oxford)

Contribution ID: **50** Type: **not specified**

Deep Learning of Quantum Correlations for Quantum Parameter Estimation of Continuously Monitored Systems

Wednesday 22 November 2023 12:15 (15 minutes)

Presenter: RINALDI, Enrico (Quantinuum K. K.)

Session Classification: Machine Learning for Quantum Science

Contribution ID: **51** Type: **not specified**

Machine learning continuously monitored systems: estimating parameters

Wednesday 22 November 2023 12:00 (15 minutes)

Presenter: BILKIS, Matias (Computer Vision Center)

Session Classification: Machine Learning for Quantum Science

Contribution ID: **52** Type: **not specified**

Channel tomography for quantum noise characterization and mitigation

Wednesday 22 November 2023 12:30 (15 minutes)

Presenter: RONCALLO, Simone (Università degli studi di Pavia)

Session Classification: Machine Learning for Quantum Science

Contribution ID: **53** Type: **not specified**

Explainable Representation Learning of Small Quantum States

Wednesday 22 November 2023 12:45 (30 minutes)

Presenter: FROHNERT, Felix (Leiden University)

Session Classification: Machine Learning for Quantum Science

Contribution ID: **54** Type: **not specified**

INVITED TALK: Accelerating Discovery in Particle Physics with AI

Thursday 23 November 2023 14:45 (45 minutes)

The quest to understand the fundamental constituents of the universe is at the heart of particle physics. However, the complexity of particle interactions, the volume of data produced by experiments, and the intricacy of theoretical models present significant challenges to advancements in this field. In recent years, artificial intelligence has emerged as a transformative tool for overcoming these challenges, offering new pathways to accelerate the pace of discovery and fostering a deeper understanding of the fundamental forces of nature. This talk aims to elucidate the pivotal role AI plays in particle physics, from optimizing detector design and operation to analyzing vast datasets and validating theoretical models.

Presenter: NGADIUBA, Jennifer (FNAL)

Contribution ID: **55** Type: **not specified**

Quantum anomaly detection in the latent space of proton collision events at the LHC

Thursday 23 November 2023 15:30 (15 minutes)

Presenter: BELIS, Vasilis (ETH Zurich (CH))

Session Classification: QML for Physics

Contribution ID: **56** Type: **not specified**

Quantum data learning for quantum simulations in high-energy physics

Thursday 23 November 2023 15:45 (15 minutes)

Presenter: Dr NAGANO, Lento (University of Tokyo (JP))

Session Classification: QML for Physics

Contribution ID: **57** Type: **not specified**

Ab initio Quantum Simulation of Strongly Correlated Materials with Quantum Embedding

Thursday 23 November 2023 16:00 (15 minutes)

Presenter: SUN, Jinzhao (Imperial college)

Session Classification: QML for Physics

Contribution ID: **58** Type: **not specified**

Detection of quantum phase transitions with quantum machine learning techniques

Thursday 23 November 2023 16:15 (15 minutes)

Presenter: MANDARINO, Antonio (ICTQT - University of Gdansk)

Session Classification: QML for Physics

Contribution ID: **59** Type: **not specified**

Simulating dynamics of large quantum systems on small quantum devices using circuit knitting

Thursday 23 November 2023 16:30 (15 minutes)

Presenter: GENTINETTA, Gian (EPFL)

Session Classification: QML for Physics

Contribution ID: **60** Type: **not specified**

Complete quantum-inspired framework for simulations of flows past immersed bodies

Thursday 23 November 2023 16:45 (15 minutes)

Presenter: TIUNOV, Egor (Technology Innovation Institute, Abu Dhabi)

Session Classification: QML for Physics

Contribution ID: **61** Type: **not specified**

Poster Session

Thursday 23 November 2023 17:00 (1h 30m)

Contribution ID: **62** Type: **not specified**

Extending Graph Transformers with Quantum Computed Aggregation

Tuesday 21 November 2023 09:30 (15 minutes)

Presenter: THABET, Slimane (PASQAL - Sorbonne University)

Session Classification: Architectures for QML 1

Contribution ID: **63** Type: **not specified**

Dimension reduction in quantum stochastic modelling

Wednesday 22 November 2023 16:15 (15 minutes)

Presenter: YANG, Chengran (Centre for Quantum Technologies, National University of Singapore)

Session Classification: Architecture for QML 3

Contribution ID: **64** Type: **not specified**

Quantum Similarity Testing with Convolutional Neural Networks

Wednesday 22 November 2023 16:00 (15 minutes)

Presenter: ZHU, Yan (The University of Hong Kong)

Session Classification: Architecture for QML 3

Contribution ID: **65** Type: **not specified**

Quantum Feature Maps for Graph Machine Learning on a Neutral Atom Quantum Processor

Wednesday 22 November 2023 14:45 (30 minutes)

Presenter: THABET, Slimane (PASQAL - Sorbonne University)

Session Classification: Experimental Implementations

Contribution ID: **66** Type: **not specified**

Variational quantum algorithms implemented on a general-purpose single-photon-based quantum computing platform

Wednesday 22 November 2023 15:15 (30 minutes)

Presenter: SALAVRAKOS, Alexia (Quandela)

Session Classification: Experimental Implementations

Contribution ID: **67** Type: **not specified**

INVITED TALK: Approximate Autonomous Quantum Error Correction with Reinforcement Learning

Friday 24 November 2023 11:15 (45 minutes)

Quantum error correction will ultimately empower quantum computers to leverage their full potential. However, substantial device overhead and the need for frequent syndrome measurements, which are themselves error-prone, render the demonstration of logical qubits that significantly surpass break-even still challenging. Autonomous quantum error correction represents a promising alternative, where an engineered environment allows to bypass the syndrome measurements. In this talk, I show how we use reinforcement learning to search for, and find, bosonic code spaces that can surpass break-even under experimentally feasible conditions. Bosonic codes are, for instance, available and utilized in some of the currently most promising and widespread quantum processors based on superconducting qubits. Surprisingly, when we increase the search space by relaxing the constraints on ideal quantum error correction, we find simple and robust code words that significantly surpass break-even while minimizing device overhead. This RL code not only reduces device complexity compared to other proposed encodings, but also outperforms its competitors in terms of its capability to correct errors.

Presenter: Dr GNEITING, Clemens (Riken)

Contribution ID: **68** Type: **not specified**

Quantum adaptive agents with efficient long-term memories

Friday 24 November 2023 12:00 (30 minutes)

Presenter: ELLIOTT, Thomas (University of Manchester)

Session Classification: Reinforcement Learning and Robust Learning

Contribution ID: **69** Type: **not specified**

Talk cancelled: Self-Correcting Quantum Many-Body Control using Reinforcement Learning with Tensor Networks

Friday 24 November 2023 12:30 (1 minute)

Presenter: METZ, Friederike (EPFL)

Session Classification: Reinforcement Learning and Robust Learning

Contribution ID: **70** Type: **not specified**

Quantum machine learning with enhanced adversarial robustness

Friday 24 November 2023 12:31 (15 minutes)

Presenter: WEST, Maxwell (The University of Melbourne)

Session Classification: Reinforcement Learning and Robust Learning

Contribution ID: **71** Type: **not specified**

Quantum algorithm for robust optimization via stochastic-gradient online learning

Friday 24 November 2023 12:47 (15 minutes)

Presenter: HUEY CHIH LIM, Debbie (University of Latvia)

Session Classification: Reinforcement Learning and Robust Learning

Contribution ID: **72** Type: **not specified**

Quantum Metropolis-Hastings algorithm with the target distribution calculated by quantum Monte Carlo integration

Friday 24 November 2023 15:00 (15 minutes)

Presenter: MIYAMOTO, Koichi (Osaka University)

Session Classification: Quantum Monte Carlo

Contribution ID: **73** Type: **not specified**

Quantum Computing Quantum Monte Carlo

Friday 24 November 2023 14:30 (30 minutes)

Presenter: SUN, Jinzhao (Imperial college)

Session Classification: Quantum Monte Carlo

Contribution ID: **74** Type: **not specified**

Performance Analysis and Comparative Study of Quantum Approximate Optimization Algorithm Variants

Friday 24 November 2023 15:30 (15 minutes)

Presenter: BLEKOS, Kostas (University of Patras)

Session Classification: Quantum Optimization

Contribution ID: **76** Type: **not specified**

Quantum optimization of Binary Neural Networks

Friday 24 November 2023 15:15 (15 minutes)

Presenter: TORTA, Pietro (SISSA)

Session Classification: Quantum Optimization

Contribution ID: **77** Type: **not specified**

Applying Genetic Algorithms to Optimize the Generalization Ability of Variational Quantum Circuits

Tuesday 21 November 2023 10:30 (15 minutes)

Presenter: MARTYNIUK, Darya (Freie Universitaet Berlin, Fraunhofer Gesellschaft)

Session Classification: Architectures for QML 1

Contribution ID: **78** Type: **not specified**

Classical Verification of Quantum Learning

Monday 20 November 2023 12:00 (30 minutes)

Presenter: HINSCHE, Marcel (Freie Universität Berlin)

Session Classification: Quantum Learning and Quantum Advantage

Contribution ID: **79** Type: **not specified**

Learning bounds and guarantees for testing (quantum) hypotheses

Monday 20 November 2023 12:30 (15 minutes)

Presenter: PETERS, Evan (University of Waterloo/Perimeter)

Session Classification: Quantum Learning and Quantum Advantage

Contribution ID: **80** Type: **not specified**

Exponential separations between classical and quantum learners

Monday 20 November 2023 12:45 (15 minutes)

Presenter: GYURIK, Casper (Leiden)

Session Classification: Quantum Learning and Quantum Advantage

Contribution ID: **81** Type: **not specified**

Classical simulations of noisy variational quantum circuits

Monday 20 November 2023 13:00 (15 minutes)

Presenter: FONTANA, Enrico (University of Strathclyde)

Session Classification: Quantum Learning and Quantum Advantage

Contribution ID: **82** Type: **not specified**

QResNet: a variational entanglement skipping algorithm

Tuesday 21 November 2023 10:00 (15 minutes)

Presenter: CROGNALETTI, Giulio (University of Trieste)

Session Classification: Architectures for QML 1

Contribution ID: **83** Type: **not specified**

Poster Session

Tuesday 21 November 2023 17:00 (1h 30m)

Contribution ID: **84** Type: **not specified**

Learning t-doped stabiliser states

Wednesday 22 November 2023 10:30 (15 minutes)

Presenter: HAMMA, Aliosha (Università di Napoli Federico II)

Session Classification: Quantum Learning and Shadows

Contribution ID: **85** Type: **not specified**

Quadratic Speedup in Quantum Zero-Sum Games via Single-Call Mirror-Prox Matrix Methods

Thursday 23 November 2023 09:00 (30 minutes)

Presenter: VASCONCELOS, Francisca

Session Classification: Quantum Algorithms

Contribution ID: **86** Type: **not specified**

Constant-depth circuits for Uniformly Controlled Gates and Boolean functions with application to quantum memory circuits

Thursday 23 November 2023 09:30 (30 minutes)

Presenter: LUONGO, Alessandro (Centre for Quantum Technologies)

Session Classification: Quantum Algorithms

Contribution ID: **87** Type: **not specified**

Quantum Distance Calculation for ε-Graph Construction

Thursday 23 November 2023 10:00 (15 minutes)

Presenter: MONA CHMIELEWSKI, Naomi (EDF Lab)

Session Classification: Quantum Algorithms

Contribution ID: **88** Type: **not specified**

Gibbs Sampling of Periodic Potentials on a Quantum Computer

Thursday 23 November 2023 10:15 (30 minutes)

Presenter: RONAGH, Pooya (University of Waterloo & 1QBit)

Session Classification: Quantum Algorithms

Contribution ID: **89** Type: **not specified**

ESA

Wednesday 22 November 2023 17:00 (15 minutes)

Presenter: LE SAUX, Bertrand (European Space Agency)

Session Classification: INDUSTRY SESSION

Contribution ID: **90** Type: **not specified**

Google

Wednesday 22 November 2023 17:15 (15 minutes)

Presenter: MCCLEAN, Jarrod (Google AI Quantum)

Session Classification: INDUSTRY SESSION

Contribution ID: **91** Type: **not specified**

IBM

Wednesday 22 November 2023 17:30 (15 minutes)

Presenter: ZOUFAL, Christa (IBM Quantum Europe)

Session Classification: INDUSTRY SESSION

Contribution ID: **92** Type: **not specified**

INTEL

Wednesday 22 November 2023 17:45 (15 minutes)

Presenter: GUERRESCHI, Gian Giacomo (Intel)

Session Classification: INDUSTRY SESSION

Contribution ID: **93** Type: **not specified**

NASA

Wednesday 22 November 2023 18:15 (15 minutes)

Presenter: VENTURELLI, Davide (NASA)

Session Classification: INDUSTRY SESSION

Contribution ID: **94** Type: **not specified**

PASQAL

Wednesday 22 November 2023 18:30 (15 minutes)

Presenter: Dr BARKOUTSOS, Panagiotis (PASQAL)

Session Classification: INDUSTRY SESSION

Contribution ID: **95** Type: **not specified**

ADVANCE TUTORIAL: Learning theory for quantum machines

Sunday 19 November 2023 10:30 (2h 45m)

In this tutorial, I will cover recent advances in developing learning theory for quantum machines. The tutorial will focus on the basic techniques for establishing prediction guarantees in quantum machine learning models and the fundamental ideas for proving the advantages of quantum machines over classical machines in learning from experiments.

Presenters: HUANG, Hsin-Yuan (Google Quantum AI, MIT); HOLMES, Zoe (EPFL)

Contribution ID: **96** Type: **not specified**

Contribution

Sunday 19 November 2023 14:45 (2h 45m)

Presenter: GHARIBIAN, Sevag

Session Classification: ADVANCE TUTORIAL: Quantum algorithms –what's quantum complexity theory got to do with it?

Contribution ID: **97** Type: **not specified**

IONQ

Wednesday 22 November 2023 18:00 (15 minutes)

Presenter: YAMADA, Masako

Session Classification: INDUSTRY SESSION

Contribution ID: **98** Type: **not specified**

Walk to Restaurant 2

Wednesday 22 November 2023 18:45 (15 minutes)

Contribution ID: **99** Type: **not specified**

Closing words

Friday 24 November 2023 16:15 (15 minutes)

Contribution ID: **100** Type: **not specified**

Logistics updates

Friday 24 November 2023 10:45 (5 minutes)