Quantum Techniques in Machine Learning 2022

7-12 November 2022

Technical Program

The schedule is given in Central European Summer Time (CEST - UTC+02 ROME - ITALY)

Monday 7 November 2022	
15:00 – 16:00	Conference registration
16:00 – 18:30	**Poster session I** Board 1: *"Comparison of gradient methods for quantum machine learning on simulator and real backend" (ID 60)* Authors: *Alexander Geng, Ali Moghiseh, Claudia Redenbach and Katja Schladitz* Presenter: *Alexander Geng* Board 2: *"Generative Modeling with Quantum Neurons" (ID 163)* Authors: *Rohan Kumar, Kaitlin Gili and Christopher Ballance* Presenter: *Rohan Kumar* Board 3: *"Quantum Generative Adversarial Networks for Anomaly Detection in High Energy Physics" (ID 47)* Authors: *Elie Bermot, Christa Zoufal, Michele Grossi, Francesco Tacchino, Sofia Vallecorsa and Ivano Tavernelli* Presenter: *Elie Bermot* Board 4: *"Variational Quantum Classifier based on POVM" (ID 165)* Authors: *Dongkeun Lee, Daniel K. Park and Joonsuk Huh* Presenter: *Dongkeun Lee* Board 5: *"Quantum finite imaginary time evolution" (ID 151)* Authors: *Jaehee Kim, Juhyeon Kim, Minheok Kang, Daniel K Park, Kyunghyun Back, Jeongho Bang and Joonsuk Huh* Presenter: *Jaehee Kim* Board 6: *"A Chemistry Application of Krylov Subspace Diagonalization Based on Quantum Power Method" (ID 183)* Authors: *Gwonhak Lee, You Kyoung Chung and Joonsuk Huh* Presenter: *Gwonhak Lee* Board 7: *"Classical to quantum convolutional neural network transfer learning" (ID 152)* Authors: *Juhyeon Kim, Joonsuk Huh and Daniel Park* Presenter: *Juhyeon Kim* Board 8: *"Error Mitigation-Aided Optimization of Parameterized Quantum Circuits: Convergence Analysis" (ID 36)* Authors: *Sharu Jose and Osvaldo Simeone* Presenter: *Ivana Nikoloska* Board 9: *"Variational quantum simulation of lattice nuclear systems" (ID 166)* Authors: *Delphine Martres, Oriel Kiss, Michele Grossi, Sofia Vallecorsa and Giuseppe Carleo* Presenter: *Delphine Martres* Board 10: *"Classical and Quantum Algorithms for Orthogonal Neural Networks" (ID 22)* Authors: *Iordanis Kerenidis, Jonas Landman and Natansh Mathur* Presenter: *Jonas Landman*

	Board 11: *"Quantum Algorithms to solve mechanical engineering problems" (ID 96)* Authors: *Josephine Hunout and Lorenzo Iannucci* Presenter: *Josephine Hunout* Board 12: *"Measurement induced nonlinear protocol for entanglement distillation with quantum neural networks" (ID 156)* Authors: *Áron Rozgonyi, Zoltán Udvarnoki, Tamás Kiss, Orsolya Kálmán and Peter Boross* Presenter: *Áron Rozgonyi* Board 13: *"Integral Transforms in Physics-Informed Quantum Machine Learning" (ID 82)* Authors: *Evan Philip, Niraj Kumar and Vincent Elfving* Presenter: *Vincent Elfving* Board 14: *"Re-QGAN: an optimized adversarial quantum circuit learning framework" (ID 84)* Authors: *Sandra Nguemto and Vicente Leyton-Ortega* Presenter: *Sandra Nguemto* Board 15: *"Regression of high dimensional angular momentum states of light" (ID 176)* Authors: *Danilo Zia, Riccardo Checcinato, Alessia Suprano, Taira Giordani, Emanuele Polino, Luca Innocenti, Alessandro Ferraro, Mauro Paternostro, Nicolò Spagnolo and Fabio Sciarrino* Presenter: *Danilo Zia* Board 16: *"Generating Quantum Convolutional Neural Network architectures" (ID 178)* Authors: *Matt Lourens, Ilya Sinayskiy, Daniel K. Park, Carsten Blank and Francesco Petruccione* Presenter: *Matt Lourens* Board 17: *"Parallel Quantum Hough Transformation" (ID 94)* Authors: *Frank Klefenz and Frank Feldhoff* Presenter: *Frank Klefenz* Board 18: *"Quantum kernel methods utilizing the geometry of parameterized quantum circuits" (ID 174)* Authors: *Yudai Suzuki, Hideaki Kawaguchi and Naoki Yamamoto* Presenter: *Yudai Suzuki* Board 19: *"Deep reinforcement learning assisted optimal Hamiltonian estimation" (ID 171)* Authors: *Minyoung Kim, Kyunghoon Jung, Hyungyu Jang and Dohun Kim* Presenter: *Minyoung Kim* Board 20: *"Quantum Kernel Methods for Solving Differential Equations" (ID 154)* Authors: *Annie E. Paine, Vincent E. Elfving and Oleksandr Kyriienko* Presenter: *Annie E. Paine* Board 21: *"Classical Splitting of Parametrized Quantum Circuits" (ID 52)* Authors: *Cenk Tüysüz, Giuseppe Clemente, Arianna Crippa, Tobias Hartung, Stefan Kühn and Karl Jansen* Presenter: *Cenk Tüysüz* Board 22: *"Differential Privacy Amplification in Quantum and Quantum-inspired Algorithms" (ID 132)* Authors: *Armando Angrisani, Mina Doosti and Elham Kashefi* Presenter: *Armando Angrisani* Board 23: *"Investigating the Performance of the Quantum Neuron Born Machine on Near-Term Hardware" (ID 164)* Authors: *Aliza Siddiqui and Kaitlin Gili* Presenter: *Aliza Siddiqui*

	Board 24: *"Unravelling physics beyond the Standard Model with unbiased anomaly detection" (ID 162)* Authors: *Julian Schuhmacher, Laura Boggia, Francesco Tacchino, Panagiotis Barkoutsos and Ivano Tavernelli* Presenter: *Julian Schuhmacher* Board 25: *"Predicting circuit success rates with artificial neural networks" (ID 168)* Authors: *Daniel Hothem, Kevin Young, Tommie Catanach and Timothy Proctor* Presenter: *Daniel Hothem* Board 26: *"Hyperparameter optimization of hybrid quantum neural networks for car classification" (ID 27)* Authors: *Asel Sagingalieva, Mo Kordzanganeh, Andrii Kurkin, Daniil Kuhmistrov, Michael Perelshtein, Alexey Melnikov, Andrea Skolik, David Von Dolen and Artem Melnikov* Presenter: *Alexey Melnikov* Board 27: *"Learning capability of parametrized quantum circuits" (ID 88)* Authors: *Dirk Heimann, Gunnar Schönhoff and Frank Kirchner* Presenter: *Gunnar Schönhoff* Board 28: *"Hamiltonian tomography of the strongly coupled open quantum systems using machine learning techniques." (ID 189)* Authors: *Kimara Naicker, Ilya Sinayskiy and Francesco Petruccione* Presenter: *Kimara Naicker* Board 29: *"Vladimir Skavysh, Sofia Priazhkina, Diego Guala and Thomas Bromley" (ID 145)* Authors: *Quantum Monte Carlo for Economics: Stress Testing and Macroeconomic Deep Learning* Presenter: *Vladimir Skavysh*
Tuesday 8 November 2022	
9:00 – 9:30	QTML 2022 - Opening
9:30 – 10:30	**Keynote Talk** *Title to be announced* Speaker: Seth Lloyd, Massachusetts Institute of Technology, USA
11:00 – 12:00	**Peter Wittek Session**
12:00 – 13:00	**Keynote Talk** *Reliable AI: Does the Next Generation Require Quantum Computing?* Speaker: Gitta Kutyniok, Ludwig Maximilian University of Munich, Germany
14:00 – 16:00	**Tutorial Talk** "*Introduction to quantum (statistical) learning theory*" Speaker: Alex B. Grilo, CNRS/Sorbonne Université, France
16:30 – 18:30	**Poster Session II** Board 1: *"First Measurements with A Quantum Vision Transformer: A Naive Approach" (ID 130)* Authors: *Dominic Pasquali, Michele Grossi and Sofia Vallecorsa* Presenter: *Dominic Pasquali* Board 2: *"Variational learning for entanglement witnessing" (ID 150)* Authors: *Francesco Scala, Stefano Mangini, Chiara Macchiavello, Daniele Bajoni and Dario Gerace* Presenter: *Francesco Scala* Board 3: *"Quantum Annealing-Assisted Bipartite Community Detection for Recommender Systems" (ID 142)* Authors: *Riccardo Nembrini, Costantino Carugno, Maurizio Ferrari Dacrema and Paolo Cremonesi* Presenter: *Maurizio Ferrari Dacrema*

	Board 4: *"Dynamical simulation via quantum machine learning with provable generalization" (ID 194)* Authors: *Joe Gibbs* Presenter: *Joe Gibbs* Board 5: *"Depth requirement reduction using sequential execution" (ID 80)* Authors: *Adrián Pérez-Salinas, Radoica Draškić, Jordi Tura and Vedran Dunjko* Presenter: *Adrián Pérez-Salinas* Board 6: *"Quantum-Aided Meta-Learning for Bayesian Binary Neural Networks via Born Machines" (ID 25)* Authors: *Ivana Nikoloska and Osvaldo Simeone* Presenter: *Ivana Nikoloska* Board 7: *"A holistic framework for problem-dependent design of reinforcement learning environments for the automated construction of quantum ansätze" (ID 136)* Authors: *Paul Faehrmann, Alissa Wilms, Jakob Kottmann, Maureen Krumtuenger, Sofiene Jerbi, Jens Eisert and Sumeet Khatri* Presenter: *Maureen Krumtuenger* Board 8: *"Case study on quantum convolutional neural network scalability" (ID 71)* Authors: *Marina O. Lisnichenko and Stanislav I. Protasov* Presenter: *Marina O. Lisnichenko* Board 9: *"Application of a Quantum Genetic Algorithm for Optimisation in Network Signal Setting Design" (ID 173)* Authors: *Giovanni Acampora, Angela Chiatto, Stefano de Luca, Roberta Di Pace, Alfredo Massa, Roberto Schiattarella and Autilia Vitiello* Presenter: *Alfredo Massa* Board 10: *"Training Quantum Classifiers through Memetic Algorithms" (ID 72)* *Authors: Angela Chiatto, Autilia Vitiello and Giovanni Acampora* *Presenter: Angela Chiatto* Board 11: *"Data re-uploading with qudits" (ID 109)* *Authors: Noah L. Wach, Manuel S. Rudolph, Fred Jendrzejewski and Sebastian Schmitt* Presenter: *Sebastian Schmitt* Board 12: *"Experimental characterisation of a non-Markovian quantum process" (ID 193)* Authors: *Christina Giarmatzi* Presenter: *Christina Giarmatzi* Board 13: *"Quantum Kernel-Based Support Vector Machine with Variational Quadratic Optimization" (ID 129)* Authors: *Siheon Park, Daniel Park and June-Koo Rhee* Presenter: *Siheon Park* Board 14: *"Using Basis-Enhanced Born Machines to Reconstruct Ground States" (ID 120)* Authors: *Abigail McClain Gomez, Susanne F. Yelin and Khadijeh Najafi* Presenter: *Abigail McClain Gomez* Board 15: *"Quantum machine learning for gravitational waves and fundamental physics" (ID 180)* Authors: *Domenica Dibenedetto, Jeremie Gobeil, Miriam Lucio Martinez, Jacco de Vries, Davide Nicotra, Daniel Campora Perez, Georgios Stamoulis, Kurt Driessens, Pietro Bonizzi, Ronald Westra and Gideon Koekoek* Presenter: *Jeremie Gobeil* Board 16: *"Non-embedding quantum kernels" (ID 170)* Authors: *Elies Gil-Fuster, Jens Eisert and Vedran Dunjko* Presenter: *Elies Gil-Fuster*

	Board 17: *"The role of dissipation in Quantum Reservoir computing" (ID 169)* Authors: *Antonio Sannia, Rodrigo Martínez-Peña, Miguel C. Soriano, Gian Luca Giorgi and Roberta Zambrini* Presenter: *Antonio Sannia* Board 18: *"Brain on quantum" (ID 155)* Authors: *Domenica Dibenedetto* Presenter: *Domenica Dibenedetto* Board 19: *"Do Quantum Circuit Born Machines Generalize?" (ID 50)* Authors: *Kaitlin Gili, Mohamed Hibat-Allah, Marta Mauri, Chris Ballance and Alejandro Perdomo-Ortiz* Presenter: *Kaitlin Gili* Board 20: *"Expressive power of quantum machine learning models" (ID 192)* Authors: *Beng Yee Gan, Supanut Thanasilp, Daniel Leykam, Dimitris G. Angelakis* Presenter: *Beng Yee Gan* Board 21: *"A perturbative gadget for avoiding barren plateaus in variational quantum algorithms" (ID 116)* Authors: *Simon Cichy, Sumeet Khatri, Jens Eisert and Paul K. Faehrmann* Presenter: *Paul K. Faehrmann* Board 22: *"Benchmarking the role of particle statistics in Quantum Reservoir Computing" (ID 153)* Authors: *Guillem Llodra, Christos Charalambous, Gian Luca Giorgi and Roberta Zambrini* Presenter: *Guillem Llodra* Board 23: *"On the practical usefulness of the Hardware Efficient Ansatz" (ID 195)* Authors: *Lorenzo Leone, Salvatore F. E. Oliviero, Lukasz Cincio and Marco Cerezo* Presenter: *Lorenzo Leone* Board 24: *"A Comparative Study On Solving Optimization Problems With Exponentially Fewer Qubits" (ID 56)* Authors: *David Winderl, Nicola Franco and Jeanette Miriam Lorenz* Presenter: *Jeanette Miriam Lorenz* Board 25: *"The Effect of Noise on the Performance of the Variational Quantum Eigensolver" (ID 157)* Authors: *Marita Oliv, Andrea Matic, Thomas Messerer and Jeanette Miriam Lorenz* Presenter: *Marita Oliv* Board 26: *"Is Variational Quantum Machine Learning with Hamiltonian Encoding better than Random Fourier Sampling?" (ID 121)* Authors: *Slimane Thabet, Jonas Landman, Constantin Dalyac, Hela Mhiri and Elham Kashefi* Presenter: *Constantin Dalyac* Board 27: *"Evaluating Generalization in Classical and Quantum Generative Models" (ID 59)* Authors: *Marta Mauri, Kaitlin Gili and Alejandro Perdomo-Ortiz* Presenter: *Marta Mauri* Board 28: *"A Generalised SWAP-Test Classifier" (ID 177)* Authors: *Shivani Pillay, Ilya Sinayskiy, Edgar Jembere and Francesco Petruccione* Presenter: *Ilya Sinayskiy* Board 29: *"Quantum Approximate Optimization Algorithm applied to the binary perceptron" (ID 58)* Authors: *Pietro Torta, Glen Bigan Mbeng, Carlo Baldassi, Riccardo Zecchina and Giuseppe Santoro*

	Presenter: *Pietro Torta* Board 30: *"Equivariant quantum circuits for learning on weighted graphs" (ID 23)* Authors: *Andrea Skolik, Michele Cattelan, Sheir Yarkoni, Thomas Bäck and Vedran Dunjko* Presenter: *Andrea Skolik*
Wednesday 9 November 2022	
9:00 – 9:30	**Invited Talk** *"Variational Quantum Imaginary Time Evolution: A discussion on error bounds, efficient approximations, and application examples"* Speaker: Christa Zoufal, IBM Zurich, Switzerland
9:30 – 10:30	**Session: *Variational quantum algorithms - Part I*** *Chair: Davide Venturelli* *9:30 – 9:50 "Exploiting symmetry in variational quantum machine learning" (ID: 20)* Authors: Johannes Jakob Meyer, Marian Mularski, Elies Gil-Fuster, Antonio Anna Mele, Francesco Arzani, Alissa Wilms and Jens Eisert Speaker: *Johannes Jakob Meyer* *9:50 – 10:10 "Avoiding barren plateaus via transferability of smooth solutions in Hamiltonian Variational Ansatz" (ID: 9)* Authors: Antonio Anna Mele, Glen Bigan Mbeng, Giuseppe Ernesto Santoro, Mario Collura and Pietro Torta. Speaker: *Antonio Anna Mele* *10:10 – 10:30 "Quantum variational learning for quantum error-correcting codes" (ID: 14)* Authors: Chenfeng Cao, Chao Zhang, Zipeng Wu, Markus Grassl and Bei Zeng. Speaker: *Chenfeng Cao*
11:00 – 12:00	**Session: *Variational quantum algorithms - Part II*** *Chair: Davide Venturelli* *11:00 – 11:10 "Select your metric carefully: achieving provably efficient variational modeling" (ID: 51)* Authors: Faris Sbahi, Antonio Martinez, Sahil Patel, Dmitri Saberi, Jae Hyeon Yoo, Geoffrey Roeder and Guillaume Verdon Speaker: *To be announced* *11:10 – 11:20 "Policy Gradients using Variational Quantum Circuits" (ID: 134)* Authors: André Sequeira, Luis Paulo Santos and Luis Soares Barbosa Speaker: *André Sequeira* *11:20 – 11:30 "Policy Gradient for Training Variational NISQ Algorithms" (ID: 1)* Authors: David Herrera Marti Speaker: *David Herrera Marti* *11:30 – 11:40 "An analogue quantum variational embedding classifier" (ID: 86)* Authors: Adrian Lupascu, Rui Yang, Samuel Bosch, Bobak Kiani and Seth Lloyd. Speaker: *Rui Yang (online)* *11:40 – 11:50 "Characterization of variational quantum algorithms using free fermions" (ID: 79)* Authors: Gabriel Matos, Chris N. Self, Zlatko Papic, Konstantinos Meichanetzidis and Henrik Dreyer Speaker: *Gabriel Matos* *11:50 – 12:00 "Qubit seriation: Undoing data shuffling using a spectral ordering approach" (ID: 115)* Authors: Atithi Acharya, Manuel Rudolph, Jing Chen and Alejandro Perdomo Ortiz Speaker: *Atithi Acharya*

12:00 – 13:00	**Keynote Talk - ONLINE** *Subtle effects in quantum circuits as machine learning models* Speaker: Jacob Biamonte, Skolkovo Institute of Science and Technology, Russian Federation
14:00 – 14:30	**Invited Talk** *"Combining Gradient Ascent and Feedback Control"* Speaker: Florian Marquardt, Max Planck Institute, Germany
14:30 – 15:50	**Session: *Quantum Optimization*** *Chair: Autilia Vitiello* *14:30 – 14:40 "GEO: Enhancing Combinatorial Optimization with Classical and Quantum Generative Models" (ID: 57)* Authors: Francisco Javier Fernandez Alcazar, Mohammad Ghazi Vakili, Can B. Kalayci and Alejandro Perdomo-Ortiz Speaker: *Francisco Javier Fernandez Alcazar* *14:40 – 15:00 "Benchmarking Quantum Heuristics and Ising Machines: Scoring Parameter Setting Strategies" (ID: 139)* Authors: Davide Venturelli, David Bernal Neira, Filip Wudarski and Eleanor Rieffel Speaker: *Davide Venturelli* *15:00 – 15:10 "Qubit-efficient encoding schemes for binary optimisation problems" (ID: 76)* Authors: Benjamin Tan, Marc-Antoine Lemonde, Supanut Thanasilp, Jirawat Tangpanitanon and Dimitris Angelakis Speaker: *Benjamin Tan* *15:10 – 15:20 "Quantum Annealing for Neural Network optimization problems: a new approach via Tensor Network simulations" (ID: 67)* Authors: Guglielmo Lami, Pietro Torta, Giuseppe Santoro and Mario Collura Speaker: *Guglielmo Lami* *15:20 – 15: 40 "Genetic Algorithms for Constructing Quantum Embeddings" (ID: 144)* Authors: Massimiliano Incudini, Francesco Martini and Alessandra Di Pierro Speaker: *Massimiliano Incudini* *15:40 – 15:50 "Quantum Neural Architecture Search with Quantum Circuits Metric and Bayesian Optimization" (ID: 29)* Authors: Trong Duong, Sang Truong, Minh Nguyen, Bao Bach, Ju-Young Ryu and June-Koo Rhee Speaker: *Ju-Young Ryu*
15:50 – 16:00	**Sponsor Talk** QUNOVA Speaker: *To be announced*
16:30 – 17:00	**Invited Talk - ONLINE** *"Trainability and generalization of quantum machine learning models"* Speaker: Patrick Coles, The University of New Mexico, New Mexico
17:00 – 18:30	**Session: *Quantum Neural Networks*** *Chair: Alexey Melnikov* *17:00 – 17:20 "Benign overfitting in shallow quantum neural networks" (ID: 66)* Authors: Evan Peters and Maria Schuld Speaker: *Evan Peters* *17:20 – 17:30 "Ensembling Techniques for Quantum Neural Networks" (ID: 64)* Authors: Massimiliano Incudini, Michele Grossi, Andrea Ceschini, Antonio Mandarino, Massimo Panella, Sofia Vallecorsa, David Windridge and Alessandra Di Pierro Speaker: *Andrea Ceschini* *17:30 – 17:40 "Introducing Non-Linearity into Quantum Generative Models" (ID: 26)* Authors: Mykolas Sveistrys, Kaitlin Gili and Chris Balance Speaker: *Mykolas Sveistrys*

	17:40 – 17:50 "Entanglement entropy production in Quantum Neural Networks" (ID: 118) Authors: Stefano Mangini, Marco Ballarin, Simone Montangero, Chiara Macchiavello and Riccardo Mengoni Speaker: *Marco Ballarin* *17:50 – 18:00 "Rapid training of quantum recurrent neural network" (ID: 89)* Authors: Michał Siemaszko, Thomas McDermott, Adam Buraczewski, Bertrand Le Saux and Magdalena Stobińska Speaker: *Michał Siemaszko* *18:00 – 18:10 "QuanGCN: Noise-Adaptive Training for Robust Quantum Graph Convolutional Networks" (ID: 18)* Authors: Kaixiong Zhou, Zhenyu Zhang, Shengyuan Chen, Tianlong Chen, Xiao Huang, Zhangyang Wang and Xia Hu Speaker: *Kaixiong Zhou (online)* *18:10 – 18:30 "The complexity of quantum support vector machines" (ID: 7)* Authors: Gian Gentinetta, Arne Thomsen, David Sutter and Stefan Woerner Speaker: *Gian Gentinetta*
Thursday 10 November 2022	
9:00 – 9:30	**Invited Talk** *"Coherence theory in attractor quantum neural networks"* Speaker: Anna Sanpera, Universitat Autonoma de Barcelona, Spain
9:30 – 10:30	**Session: *Quantum Neural Networks and other topics*** *Chair: Giovanni Acampora* *9:30 – 9:40 "Quantum Machine Learning for Portfolio Hedging Optimization" (ID: 78)* Authors:Jules Plaire, Paulin Jacquot and Thomas Deschatre Speaker: *Paulin Jacquot* *9:40 – 9:50 "Evaluation of variational quantum states entanglement on a quantum computer by the mean value of spin" (ID: 42)* Authors: Khrystyna Gnatenko Speaker: *Khrystyna Gnatenko* *9:50 – 10:00 "Efficient Quantum State Preparation Using Decision Diagrams" (ID: 53)* Authors: Fereshte Mozafari, Giovanni De Micheli and Yuxiang Yang Speaker: *Fereshte Mozafari (online)* *10:00 – 10:10 "Conditional Born machine for Monte Carlo events generation" (ID: 2)* Authors: Oriel Kiss, Michele Grossi, Enrique Kajomovitz and Sofia Vallecorsa Speaker: *Oriel Kiss* *10:10 – 10:20 "Monitored Quantum Reservoir Computing" (ID: 98)* Authors: Pere Mujal, Rodrigo Martínez-Peña, Gian Luca Giorgi, Miguel C. Soriano and Roberta Zambrini Speaker: *Pere Mujal* *10:20 – 10:30 "Quantum Fuzzy Control of Particle Beams" (ID: 113*) Authors: Giovanni Acampora, Michele Grossi, Michael Schenk and Roberto Schiattarella Speaker: *Roberto Schiattarella*
11:00 – 12:00	**Session: *Machine learning and Quantum systems - Part I*** *Chair: Riccardo Mengoni* *11:00 – 11:20 "Conceptual understanding enabled by efficient automated design of quantum optical setups" (ID:87)* Authors: Mario Krenn, Jakob Kottmann, Nora Tischler and Alan Aspuru-Guzik

	Speaker: *Nora Tischler* *11:20 – 11:40 "Neural network enhanced measurement efficiency for molecular groundstates" (ID: 83)* Authors: Dmitri Iouchtchenko, Jérôme F. Gonthier, Alejandro Perdomo-Ortiz and Roger G. Melko Speaker: *Dmitri Iouchtchenko* *11:40 – 12:00 "Out-of-distribution generalization for learning quantum dynamics and dynamical simulation" (ID: 21)* Authors: Matthias C. Caro, Hsin-Yuan Huang, Joe Gibbs, Nicholas Ezzell, Andrew Sornborger, Lukasz Cincio, Patrick Coles and Zoe Holmes Speaker: *Zoe Holmes*
12:00 – 12:30	**Invited Talk** *"Data mining the output of quantum simulators - from critical behavior to algorithmic complexity"* Speaker: Marcello Dalmonte, International Centre for Theoretical Physics, Italy
12:30 – 13:00	**Invited Talk** *"Exploiting machine learning for quantum dynamics and viceversa"* Speaker: Cristiano Ciuti, Université Paris Cité, France
14:00 – 16:00	**Industrial Track** *Chair: Michele Grossi, CERN* Speakers: *Bertrand Le Saux, European Space Agency (ESA)* *Christa Zoufal, IBM Quantum* *Alejandro Perdomo-Ortiz, Zapata* *Vincent Elfving, Pasqal* *Nicola Lo Gullo, VTT Finland* *Fraunhofer (projects with the German industry):* *Klau, Dennis, Fraunhofer IAO, Expert for AutoQML* *Pranjic, Daniel, Fraunhofer IAO, Expert for Quantum Kernel Methods and Regression* *Kreplin, David, Fraunhofer IPA, Expert for Quantum Feature Maps* *Riccardo Mengoni, CINECA* *Daniele Dragoni, Leonardo*
16:30 – 17:30	**Session: *Machine learning and Quantum systems - Part II*** *Chair: Yihui Quek* *16:30 – 16:50 "Flexible learning of quantum states with generative query neural networks" (ID: 70)* Authors: Yan Zhu, Ya-Dong Wu, Ge Bai, Dong-Sheng Wang, Yuexuan Wang and Giulio Chiribella Speaker: *Yan Zhu* *16:50 – 17:10 "Predicting Gibbs State Expectation Values with Pure Thermal Shadows" (ID: 32)* Authors: Luuk Coopmans, Yuta Kikuchi and Marcello Benedetti Speaker: *Luuk Coopmans* *17:10 – 17:30 "Learning quantum channels without input control" (ID: 99)* Authors: Marco Fanizza, Yihui Quek and Matteo Rosati Speaker: *Marco Fanizza*

17:30 – 18:30	**Keynote Talk - ONLINE** *Physics and Machine Learning* Speaker: Sankar Das Sarma, University of Maryland, USA
Friday 11 November 2022	
9:00 – 9:30	**Invited Talk** *To be announced* Speaker: Shaohan Hu, JPMorgan Chase & Co., USA
9:30 – 10:20	**Session: *Quantum Learning Methods - Part I*** *Chair: Antonio Mandarino* *9:30 – 9:50 "Unifying Quantum Machine Learning Models: Theory and Practical Implications" (ID: 85)* Authors: Sofiene Jerbi, Lukas Fiderer, Hendrik Poulsen Nautrup, Jonas Kübler, Hans Briegel and Vedran Dunjko Speaker: *Sofiene Jerbi* *9:50 – 10:00 "Pricing multi-asset derivatives by finite difference method on a quantum computer" (ID: 11)* Authors: Koichi Miyamoto, Kenji Kubo, Kosuke Mitarai and Keisuke Fujii Speaker: *Koichi Miyamoto* *10:00 – 10:20 "Learning via Many Body Localized Hidden Born Machine" (ID: 138)* Authors: Sona Najafi, Weishun Zhong, Xun Gao and Susanne Yelin Speaker: *Sona Najafi*
10:20 – 10:30	**Sponsor Talk** QUANTUMNET Speaker: *To be announced*
11:00 – 12:00	**Session: *Quantum Learning Methods - Part II*** *Chair: David Windridge* *11:00 – 11:10 "Building spatial symmetries into parameterized quantum circuits for faster training" (ID: 127)* Authors: Frederic Sauvage, Martin Larocca, Patrick Coles and Marco Cerezo Speaker: *Frederic Sauvage* *11:10 – 11:20 "Symbiosis of Tensor Networks and Quantum Circuits in Training Parametrized Quantum Algorithms" (ID: 107)* Authors: Manuel S. Rudolph, Atithi Acharya, Jing Chen, Jacob Miller and Alejandro Perdomo-Ortiz Speaker: *Manuel S. Rudolph* *11:20 – 11:30 "Bayesian Learning of Parameterised Quantum Circuits" (ID: 13)* Authors: Samuel Duffield, Marcello Benedetti and Matthias Rosenkranz Speaker: *Samuel Duffield* *11:30 – 11:40 "Parameterized quantum circuits for rare dynamic learning" (ID: 128)* Authors: Alissa Wilms, Laura Ohff, Andrea Skolik and Jens Eisert Speaker: *Laura Ohff* *11:40 – 12:00 "Group-Invariant Quantum Machine Learning" (ID: 35)* Authors: Martin Larocca, Frederic Sauvage, Faris Sbahi, Guillaume Verdon, Patrick Coles and Marco Vinicio Sebastian de la Roca Speaker: *Martin Larocca*
12:00 – 12:30	**Invited Talk** *"Machine learning quantum states and operations: from neural networks to optimization on manifolds"* Speaker: Shahnawaz Ahmed, Chalmers University of Technology, Sweden
12:30 – 13:00	**Invited Talk** *"Towards an Artificial Muse for new Ideas in Quantum Physics"*

	Speaker: Mario Krenn, Max Planck Institute, Germany
14:00 – 15:00	**Session: *Quantum Learning Methods - Part III*** *Chair: Massimiliano Incudini* *14:00 – 14:10 "Quantum Reinforcement Learning via Policy Iteration" (ID: 103)* Authors: El Amine Cherrat, Iordanis Kerenidis and Anupam Prakash Speaker: *El Amine Cherrat* *14:10 – 14:20 "Quantum Extremal Learning" (ID: 74)* Authors: Savvas Varsamopoulos, Evan Philip, Herman W. T. van Vlijmen, Sairam Menon, Ann Vos, Natalia Dyubankova, Bert Torfs, Anthony Rowe and Vincent E. Elfving Speaker: *Savvas Varsamopoulos* *14:20 – 14:30 "Quantum versus Classical Autoencoders" (ID: 91)* Authors: Coral Featherstone and Francesco Petruccione Speaker: *Coral Featherstone (online)* *14:30 – 14:40 "A Quantum Enhanced Learning Algorithm for Maze Problems" (ID 45)* Authors: *Oliver Sefrin and Sabine Wölk* Presenter: *Oliver Sefrin* *14:40 – 14:50 "Hyperparameter Importance of Quantum Neural Networks Across Small Datasets" (ID: 16)* Authors: Charles Moussa, Jan N. van Rijn, Thomas Baeck and Vedran Dunjko Speaker: *Charles Moussa* *14:50 – 15:00 "Multiclass classification based on quantum state discrimination" (ID: 77)* Authors: Giuseppe Sergioli, Andres Camilo Granda Arando, Roberto Giuntini, Hector Carlos Freytes and Federico Hernan Holik Speaker: *Giuseppe Sergioli (online)*
15:00 – 16:30	**Session: *Computational Learning Theory*** *Chair: Mario Krenn* *15:00 – 15:20 "Clifford Circuits can be Properly PAC Learned if and only if RP=NP" (ID: 3)* Authors: Daniel Liang Speaker: *Daniel Liang* *15:20 – 15:30 "A single T-gate makes distribution learning hard" (ID: 90)* Authors: Marcel Hinsche, Marios Ioannou, Alexander Nietner, Jonas Haferkamp, Yihui Quek, Dominik Hangleiter, Jean-Pierre Seifert, Jens Eisert and Ryan Sweke Speaker: *Marios Ioannou* *15:30 – 15:50 "Classical surrogates for quantum learning models" (ID: 28)* Authors: Franz J. Schreiber, Jens Eisert and Johannes Jakob Meyer Speaker: *Franz J. Schreiber* *15:50 – 16:10 "Exponential concentration and untrainability in quantum kernel methods" (ID: 111)* Authors: Supanut Thanasilp, Samson Wang, Marco Cerezo and Zoe Holmes Speaker: *Supanut Thanasilp* *16:10 – 16:20 "Subtleties in the trainability of quantum machine learning models" (ID: 114)* Authors: Supanut Thanasilp, Samson Wang, Nhat Anh Nghiem Vu, Patrick Coles and Marco Vinicio Sebastian de la Roca Speaker: *Supanut Thanasilp* *16:20 – 16:30 "Quantum Boosting using Domain-Partitioning Hypotheses" (ID: 37)* Authors: Sagnik Chatterjee, Rohan Bhatia, Parmeet Singh Chani and Debajyoti Bera Speaker: *Sagnik Chatterjee*

17:00 – 17:30	**Invited Talk - ONLINE** *"Information scrambling for navigating the learning landscape of a quantum machine learning model"* Speaker: Sabre Kais, Purdue University, USA
17:30 – 18:30	**Keynote Talk - ONLINE** *The Google Quantum AI team's current Perspective on Quantum Machine Learning* Speaker: Hartmut Neven, Google Quantum AI, USA
Saturday 12 November	
9:00 – 9:10	Workshop on Quantum Software - Opening
9:10 – 10:00	**Keynote Talk** *Quantum Hoare logic and its applications* Speaker: Mingsheng Ying, Chinese Academy of Science, Beijing
10:00 – 10:20	*Quantum Data Types via Linear Homotopy Type Theory* Speaker: Urs Schreiber, CQTS, New York University, Abu Dhabi
10:20 – 10:40	**Coffee Break**
10:40 – 11:00	*To be announced* Speaker: Johanna Barzen, University of Stuttgart
11:00 – 11:20	*We need more PISQ-driven Quantum Logic Research* Speaker: Koen Bertels, University of Porto
11:20 – 11:40	*To be Announced* Speaker: Sebastian Feld, QuTech, Delft University of Technology
11:40 – 12:00	*To be Announced* Speaker: Medina Bandic, Delft University of Technology
12:00 – 12:50	**Lunch Break**
12:50 – 13:10	*MQT: The Munich Quantum Toolkit* Speaker: Kevin Mato, Technical University of Munich
13:10 – 13:30	*Software Solutions to Hardware Limitations for Quantum Sampled RBMs* Speaker: Ilmo Salmenperä, University of Helsinki
13:30 – 13:50	*A Static Analysis of Uncomputation* Speaker: Nicola Assolini, University of Verona
13:50 – 14:00	**Closing**