# Carlos Bravo-Prieto

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## Education

2022 **University of Barcelona**.
PhD in Quantum Computation and Quantum Information.
Supervisor: Prof. Dr José I. Latorre

2017 **Institute of Photonic Sciences (ICFO)**.
MSc in Photonics specializing in Quantum Physics.

2016 **University of Barcelona**.
BSc in Physics.

## Experience

*Research*

10/22 - Present **Freie Universität Berlin**, *Postdoctoral Researcher*, Berlin, Germany.
Near-term quantum computing and quantum-assisted machine learning.
Jens Eisert's group.

09/20 - 09/22 **Technology Innovation Institute**, *Associate Researcher*, Abu Dhabi, UAE.
Research and software development for quantum algorithms.

06/19 - 08/19 **Los Alamos National Laboratory**, *Fellowship*, Los Alamos, USA.
Quantum algorithms for linear systems of equations.
Patrick J. Coles' group.

09/18 - 09/20 **Barcelona Supercomputing Center**, *Research Engineer*, Barcelona, Spain.
Variational quantum algorithms.

*Visitor*

07/22 - 08/22 **Centre for Quantum Technologies**, National University of Singapore, Singapore.

## Journal Publications

2024 Elies Gil-Fuster, Jens Eisert, and **Carlos Bravo-Prieto**, Understanding quantum machine learning also requires rethinking generalization, *Nature Communications 15, 2277.*

2023 **Carlos Bravo-Prieto**, Ryan LaRose, Marco Cerezo, Yigit Subaşı, Lukasz Cincio and Patrick J. Coles, Variational quantum linear solver, *Quantum 7, 1188.*

2022 **Carlos Bravo-Prieto**, Julien Baglio, Marco Cé, Anthony Francis, Dorota M. Grabowska, and Stefano Carrazza, Style-based quantum generative adversarial networks for Monte Carlo events, *Quantum 6, 777.*

2022 Mirko Consiglio, Wayne J. Chetcuti, **Carlos Bravo-Prieto**, Sergi Ramos-Calderer, Anna Minguzzi, José I. Latorre, Luigi Amico, and Tony J. G. Apollaro, Variational quantum eigensolver for SU($N$) fermions, *Journal of Physics A: Mathematical and Theoretical 55, 265301.*

2022 Sergi Ramos-Calderer, **Carlos Bravo-Prieto**, Ruge Lin, Emanuele Bellini, Marc Manzano, Nawja Aaraj, and José I. Latorre, Solving systems of boolean multivariate equations with quantum annealing, *Physical Review Research 4, 013096.*

2021 Stavros Efthymiou, Sergi Ramos-Calderer, **Carlos Bravo-Prieto**, Adrián Pérez-Salinas, Diego García-Martín, Artur Garcia-Saez, José I. Latorre and Stefano Carrazza, Qibo: a framework for quantum simulation with hardware acceleration, *Quantum Science and Technology 7, 015018.*

2021 **Carlos Bravo-Prieto**, Quantum autoencoders with enhanced data encoding, *Machine Learning: Science and Technology 2, 035028.*

2020 Sergi Ramos-Calderer, Adrián Pérez-Salinas, Diego García-Martín, **Carlos Bravo-Prieto**, Jorge Cortada, Jordi Planagumà, and José I. Latorre, Quantum unary approach to option pricing, *Physical Review A 103, 032414. (Editors' suggestion)*

2020 **Carlos Bravo-Prieto**, Josep Lumbreras-Zarapico, Luca Tagliacozzo, and José I. Latorre, Scaling of variational quantum circuit depth for condensed matter systems, *Quantum 4, 272.*

2020 **Carlos Bravo-Prieto**, Diego García-Martín, and José I. Latorre, Quantum singular value decomposer, *Physical Review A 101, 062310.*

2020 Adrián Pérez-Salinas, Diego García-Martín, **Carlos Bravo-Prieto**, and José I. Latorre, Measuring the tangle of three-qubit states, *Entropy, 22, 436.*

## Pre-Print Publications

[In preparation] Learning complexity gradually in quantum machine learning models, anticipated 2024.

## Programming Languages

Classical Python, Fortran, Matlab, Mathematica.

Quantum Qibo (TII), Qiskit (IBM), Cirq (Google), PennyLane (Xanadu), Pyquil (Rigetti computing).

## Software Development

**Qibo**, *https://github.com/qiboteam/qibo*, Developer.
Framework for quantum simulation with hardware acceleration.

**Qiskit**, *https://github.com/qiskit-community*, Contributor.
Implemented arithmetic operations as quantum circuits.

## Awards and Honors

2022 **PhD Excellent Cum Laude**, *University of Barcelona.*

2019 **Quantum computing Summer School Fellowship**, *Los Alamos National Laboratory.*
1/20 awarded internationally.

2019 **Unitary Fund Grant**.
$2k for open-source quantum software development.

2018 **IBM Teach me Qiskit Award**, *Top contributions.*
Implemented quantum networks for arithmetic operations, from addition to modular exponentiation.

## Presentations

2024 ***[Invited talk]*** **Machine Learning and Quantum Physics workshop in Obergurgl**.
Understanding quantum machine learning also requires rethinking generalization.

2023 **Los Alamos National Laboratory Quantum Seminars**.
Understanding quantum machine learning also requires rethinking generalization.

2023 ***[Invited talk]*** **IPAM's Mathematical Aspects of Quantum Learning Workshop**.
Understanding quantum machine learning also requires rethinking generalization.

2023 ***[Invited talk]*** **Quantum Spain Research Seminars**.
Exploring applications of variational quantum algorithms in linear algebra.

2022 **CTP-PAS Quantum Information and Quantum Computing Seminars**.
Variational quantum architectures for linear algebra applications.

2022 ***[Invited talk]*** **IPAM's Quantum Numerical Linear Algebra Workshop**.
Variational quantum architectures for linear algebra applications.

2021 **Snowmass Workshop on Quantum Computing for High-Energy Physics**.
Style-based quantum generative adversarial networks for Monte Carlo events.

2020 **Quantum Computing Theory in Practice**.
[Poster] Variational quantum linear solver.

2020 **APS March Meeting**.
Variational quantum linear solver.

2019 **Los Alamos National Laboratory Student Symposium**.
Variational quantum linear solver.

2019 ***[Invited talk]* IBM Quantum Computing Workshop**.
Quantum singular value decomposer.

2019 **V Pyrenees Quantum Information Winter School**.
Scaling of variational quantum circuit depth for condensed matter systems.

## Panels

2021 **Snowmass Workshop on Quantum Computing for High-Energy Physics**.
Panel discussion with industry and academic members.

## Referee for Journals

Nature Communications

Quantum

Physical Review A

Physical Review Research

Machine Learning: Science and Technology