Francesco Arzani

Researcher in quantum information and quantum optics

✉ frarzani@zedat.fu-berlin.de
frarzani.github.io/

Academic and professional experience

05/2021–current **Freelance researcher**, *Xanadu Quantum Technologies – Toronto, Ontario, Canada.*

09/2020–current **Humboldt post-doctoral Fellow**, *Freie Universiät Berlin – Quantum information theory, quantum many-body theory, and quantum optics group*,
Supervisor: Prof. Jens Eisert.

10/2018–10/2019 **Post-doctoral researcher**, *MOCQUA team – Loria, Nancy & Quantum Information group – Laboratory of Informatics of Paris 6*,
Supervisors: Dr. Damian Markham, Dr. Simon Pedrix.

04/2018–9/2018 **Post-doctoral researcher**, *Université Paris Diderot & Paris center for quantum computing*,
Supervisors: Dr. Damian Markham, Dr. Iordanis Kerenidis.

Education

01/2015–03/2018 **PhD in Physics**, *École Normale Supérieure, Paris; Kastler Brossel Laboratory*,
Thesis: "Measurement-based quantum information with optical frequency combs",
Supervisors: Prof. Nicolas Treps & Prof. Claude Fabre.
Funding: Paris Sciences Lettres Research University

10/2012–12/2014 **Master's degree in Theoretical Physics**, *Università degli Studi di Pavia*,
Master's thesis: "Measurement-based quantum information with optical frequency combs",
Supervisor: Prof. Chiara Macchiavello; Co-supervisors Prof. Nicolas Treps & Dr. Giulia Ferrini.
Grade: 110/110 cum laude (with honours)

02/2014–08/2014 **Master's internship**, *Quantum Optics group – Kastler Brossel Laboratory, Université Paris 6 Pierre et Marie Curie.*

09/2013–07/2014 **ERASMUS exchange period**, *Université Paris 6 Pierre et Marie Curie.*

09/2009–10/2012 **Bachelor's Degree in Physics**, *Università degli Studi di Pavia*,
Bachelor's thesis: "An informational approach to quantum thermodynamics beyond the von Neumann Regime",
Supervisor: Dr. Paolo Perinotti.
Grade: 110/110

2009 **High school diploma**, *Liceo scientifico tecnologico, IIS "Guglielmo Marconi"*, Tortona.
Grade: 100/100 cum Laude (with honours)

Awards and fellowships

09/2020–08/2022 **Humboldt postdoctoral fellowship**, *Freie Universität Berlin.*

09/2009–07/2015 **Student at IUSS**, *Istituto Universitario di Studi Superiori, Pavia.*

09/2009–07/2014 **Student at Collegio Ghislieri**, *Pavia*, Residence for university students with merit based admission.

Teaching and outreach

11/2019 **Fête de la Science**, *Sorbonne Univérsité*,
Presentation of quantum information to high school students.

09/2018–12/2018 **Teaching assistant and lab demonstrator**, *Univérsité d'Évry val d'Essonne*,
Introduction to experimental physics.

Academic reviewing

Phys. Rev. Lett., Phys. Rev. A, Quantum Journal, JOSA B, Eur. Phys. J. D, Optics Express, QIP (conference).

Languages

Mother tongue	Italian
Fluent	English, French
Basic	German

Computer Skills

Operating systems	Unix/Linux, Windows
Programming languages	Wolfram Mathematica, Python, C++

Publications

Journal articles

- *Random coding for sharing bosonic quantum secrets.*
  F. Arzani, G. Ferrini, F. Grosshans, D. Markham
  Physical Review A 100 (2), 022303 (2019). (arXiv:1808.06870)
- *Bloch-Messiah reduction for twin beams of light.*
  D. B. Horoshko, L. La Volpe, **F. Arzani**, N. Treps, C. Fabre, M. I. Kolobov
  Physical Review A 100 (1), 013837(2019). (arXiv:1903.06578)
- *High-dimensional quantum encoding via photon-subtracted squeezed states.*
  F. Arzani, A. Ferraro, V. Parigi
  Physical Review A 99 (2), 022342 (2019). (arXiv:1811.09263)
- *Violating Bell inequalities with entangled optical frequency combs and multi-pixel homodyne detection.*
  W. N. Plick, **F. Arzani**, N. Treps, E. Diamanti, D. Markham
  Physical Review A 98 (6), 062101 (2018). (arXiv:1805.06059)
- *Reconfigurable optical implementation of quantum complex networks.*
  J. Nokkala, **F. Arzani**, F. Galve, R. Zambrini, S. Maniscalco, J. Piilo, N. Treps, V. Parigi.
  New Journal of Physics 20 (5), 053024 (2018). (arXiv:1708.08726)
- *Versatile engineering of multimode squeezed states by optimizing the pump spectral profile in spontaneous parametric down-conversion.*
  F. Arzani, C. Fabre, N. Treps.
  Physical Review A 97 (3), 033808 (2018). (arXiv:1709.10055)
- *Polynomial approximation of non-Gaussian unitaries by counting one photon at a time.*
  F. Arzani, N. Treps, G. Ferrini
  Physical Review A 95 (5), 052352 (2017). (arXiv:1703.06693)
- *Multimode entanglement in reconfigurable graph states using optical frequency combs.*
  Y. Cai, J. Roslund, G. Ferrini, **F. Arzani**, X. Xu, C. Fabre, N. Treps.
  Nature Communications 8, 15645 (2017). (arXiv:1605.02303)
- *A direct approach to Gaussian measurement based quantum computation.*
  G. Ferrini, J. Roslund, **F. Arzani**, C. Fabre, N. Treps.
  Physical Review A 94 (6), 062332 (2016). (arXiv:1605.03350)
- *Optimization of networks for measurement-based quantum computation.*
  G. Ferrini, J. Roslund, **F. Arzani**, Y. Cai, C. Fabre, N. Treps.
  Physical Review A 91 (3), 032314 (2015). (arXiv:1407.5318)

Other

- *Harmonizing continuous noise to build a modular photonic quantum computer.*
  F. Arzani
  Quantum Views 5, 51 (2021).
- *Measurement based quantum information with optical frequency combs.*
  F. Arzani
  PhD Thesis, Paris Sciences Lettres and École Normale Supérieure de Paris (2018)

Conferences, workshops, schools

08/2019 **CQIQC VIII**,
Contributed talk *Conference on quantum information and quantunm control, Fields Institute, Toronto, Canada*,
"Random coding for sharing bosonic quantum secrets".

11/2018 **Q-Turn 2018**,
Contributed talk *Workshop on changing paradigms in quantum science, Universidade Federal de Santa Catarina, Florianópolis, Brazil*,
"Quantum secret sharing using squeezing and almost any passive interferometer".

11/2018 **JIQ 2018**,
Contributed talk *Journées d'Informatique Quantique, Laboratoire Lorrain de rechèrche en informatique et ses applications, Nancy, France*,
"Quantum secret sharing using squeezing and almost any passive interferometer".

09/2018 **QuTech 2018**,
Contributed talk *Quantum technology international conference, 1st edition, Kastler Brossel laboratory, Paris, France*,
"Versatile engineering of multimode squeezed states by optimizing the pump spectral profile in spontaneous parametric down-conversion".

09/2017 **Workshop on quantum science and technologies**,
Contributed talk *International Center for Theoretical Physics, Trieste, Italy*,
"Polynomial approximation of non-Gaussian unitaries by counting one photon at a time".

05/2017 **Photons beyond qubits 2017**,
Invited talk *Palacký University, Olomouc, Czech Republic*,
"Measurement-based quantum information protocols with optical frequency combs".

04/2017 **Quantum information and measurement 2017**,
Contributed talk *4th edition, Université Pierre et Marie Curie, Paris, France*,
"Shaping the Pump of a Synchronously Pumped Optical Parametric Oscillator for Continous - Variable Quantum Information".

11/2016 **GDR Quantum Information 2016**,
Poster *7th colloquium of the CNRS research network on Quantum information, foundations and applications, Télécom ParisTech, Paris, France*,
"Shaping the Pump of a Synchronously Pumped Optical Parametric Oscillator for Continous - Variable Quantum Information".

06/2016 **CEWQO 2016**,
Poster *23rd central european workshop on quantum optics,Orthodox Academy of Crete, in Kolymbari, Crete, Greece*,
"Quantum Computing with Optical Frequency Combs".

04/2015 **International School on Parametric Nonlinear Optics**,
Attendance *Les Houches School of Physics, Les Houches, France*.