

Matteo Marinelli

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EDUCATION & WORK EXPERIENCE

- October 2024-present **Tenure track assistant professor (RTT) at Università di Trieste**
Started a new research group working on quantum interconnects using ytterbium atoms trapped in optical tweezers
- April 2022-August 2024 **Postdoctoral Fellow at JILA, Boulder, Colorado.**
Postdoc.Mobility fellowship issued by the Swiss National Science Foundation.
Project title: “Towards fault-tolerant quantum computation in a cryogenic Rydberg-atom quantum computer”.
- March 2021-present **Occasional external consultant for McKinsey & Company** on projects related to quantum computing and trapped-ion quantum technology.
- May 2020-March 2022 **Experimental lead scientist at ETH-PSI Quantum Computing Hub**
Lead the design and construction of the experimental trapped-ion apparatus to manipulate up to 50 ions. Together with Cornelius Hempel and Jonathan Home, hiring and supervision of 1 Postdoc, 2 Ph.D. students, and 3 engineers.
- May 2014-April 2020 **Physics Ph.D.**, Trapped Ion Quantum Information group (www.tiqi.ethz.ch), ETH Zürich. Dissertation title: “Quantum information processing with mixed-species ion crystals”.
Experimental demonstration of up to 50 sequential measurements of correlations between two beryllium ion qubits using an ancillary calcium qubit. Stabilization of parity subspaces and Bell states through fast real-time feedback. Motional modes engineering of a single trapped calcium ion to create squeezed states, coherent states, and GKP states.
- 2012-2014 **Physics Master** ETH Zurich (*cum laude* and 2015 Willi Studer prize as best physics student in physics). Dissertation title: “High finesse cavity for optical trapping of ions”.
- 2009-2012 **Physics Bachelor** (110 *cum laude*/110), Università degli studi di Milano. Dissertation title: “Indirect observations of dark matter with measurements of strong gravitational lensing”.
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INSTITUTIONAL RESPONSIBILITIES

- 2024-present **UNITS:** Supervision of 1 PhD student (Christian Kodarin), 1 intern (Shashank Suman), 2 master students (Christian Kodarin, Federica Marroccella), 2 bachelor students (Anna Vittor, Mario Collodel)
- 2022-2024 **JILA:** Co-supervision of 1 summer student (Prithvi Raj Datla) and 4 Ph.D students in two different experimental setups (Ting-Wei Hsu, Zhenpu Zhang, Tingyou Tan and Steven Pampel)
- May 2020-March 2022 **PSI:** Co-supervision of 1 postdoc (Jackson Ang'ong'a) and 2 Ph.D. students (Edgar Brucke and Philip Leindecker). Supervision of 1 Master student (Michael Marti), 1 intern student (Olivia Hefti), and 1 semester student (Alexandra Tora).

- 2020 **“ETH meets Davos: Rethinking creativity”**. I helped building and presented the exposition about quantum physics, located at the ETH pavilion in Davos during the World Economic Forum (WEF) 2020.
- 2020 **Public conference and high school lecture** in Domodossola (Italy) during the first edition of “Settimana della scienza” (science week), where I talked about quantum computers.
- 2016 **Presenter at “Scientifica”**, an outreach event organized by ETH Zürich. I explained experiments about quantum mechanics and quantum computing in collaboration with QSIT (Quantum Science and Technology).
- 2003-2012 **Scientific volunteer at the astronomical observatory “G.V. Schiaparelli”**, Campo dei Fiori, Varese (Italy).
Scientific guide and co-organizer of outreach events on astronomy, botany, and environmental sciences. Guide for weekly visits to the astronomic observatory and botanic garden. Leading role in the management of the botanic garden and greenhouse.

LANGUAGE SKILLS

Italian (native speaker), English (C2), German (oral B1-B2, written A2-B1)

PROGRAMMING SKILLS

Proficient in C\C++, Python, Matlab, Julia, Mathematica

SELECTED PUBLICATION LIST

Full list available on

ORCID: 0000-0002-1981-8182

Google Scholar : 1713 citation, h-index:14

- 1 Microsecond-scale high-survival and number resolved detection of ytterbium atom arrays
A. Muzi Falconi, R. Panza, S. Sbernadori, R. Forti, R. Klemt, O.A. Karim, M. Marinelli, F. Scazza
Phys. Rev. Letters 135 (2025)
- 2 Local vs nonlocal dynamics in cavity coupled Rydberg-Atom arrays
Z. Bacciconi, H. B. Xavier, M. Marinelli, D. S. Bhakuni, M. Dalmonte
Phys. Rev. Letters 134 (2025)
- 3 A high optical access cryogenic system for Rydberg atom arrays with a 3000-second trap lifetime
Z. Zhang, T.-W. Hsu, T. Y. Tan, D. H. Slichter, A.M. Kaufman, M. Marinelli, C. A. Regal
Phys. Rev. X Quantum 6 (2025)
- 4 Quantifying light-assisted collisions in optical tweezers across the hyperfine spectrum
S.K. Pampel, **M. Marinelli**, M.O. Brown, J. P. D’Incao, and C. A. Regal
Phys. Rev. Lett. 134, 013202 (2025)
- 5 Long-range-enhanced surface code
Y. Hong, **M. Marinelli**, A. M. Kaufman, A. Lucas
Physical Review A 110 (2), 022607 (2024)

- 6 Encoding a qubit in a trapped-ion mechanical oscillator
C. Flühmann, T.L. Nguyen, **M. Marinelli**, V. Negnevitsky, K. Mehta, J.P. Home
Nature 566 (7745), 513-517 (2019)
- 7 Repeated multi-qubit readout and feedback with a mixed-species trapped-ion register
V. Negnevitsky*, **M. Marinelli***, K.K. Mehta, H-Y Lo, C.Flühmann, J.P. Home
Nature 563, 527-531 (2018) (*co-corresponding author*)
- 8 Sequential modular position and momentum measurements of a trapped ion mechanical oscillator
C. Flühmann, V. Negnevitsky, **M. Marinelli**, J.P. Home
Physical Review X 8 (2), 021001 (2018)
- 9 Parallel Transport Quantum Logic Gates with Trapped Ions
L. E. de Clercq, **M. Marinelli***, H.-Y. Lo *, D. Nadlinger, R. Oswald, V. Negnevitsky, D. Kienzler, B.C. Keitch, J.P. Home
Physical Review Letters, vol. 116: no. 8 (2016) Editors' suggestion & Featured in Physics
- 10 Generation of large coherent states by bang–bang control of a trapped-ion oscillator
J. Alonso, F. Leupold, Z. Solèr, M. Fadel, **M. Marinelli**, B. Keitch, V. Negnevitsky, J. Home
Nature communications 7 (1), 11243 (2016)
- 11 Estimation of a general time-dependent Hamiltonian for a single qubit
L. E. De Clercq, R. Oswald, C. Flühmann, B.C. Keitch, D. Kienzler, H.-Y. Lo, **M. Marinelli**, D. Nadlinger, V. Negnevitsky, J.P. Home
Nature Communications 7, 11218 (2016)
- 12 Observation of quantum interference between separated mechanical oscillator wave packets
D. Kienzler, C. Flühmann, V. Negnevitsky, H-Y Lo, **M. Marinelli**, D. Nadlinger, J.P. Home
Phys. Rev. Lett 116 (14), 140402 (2016) Editors' suggestion
- 13 Spin–motion entanglement and state diagnosis with squeezed oscillator wavepackets
H-Y Lo, D. Kienzler, L. de Clercq, **M. Marinelli**, V.Negnevitsky, B.C Keitch, J.P. Home
Nature 521 (7552), 336-339 (2015)
- 14 Quantum harmonic oscillator state synthesis by reservoir engineering
D. Kienzler, H-Y. Lo, B. Keitch, L. de Clercq, F. Leupold, F. Lindenfesler, **M. Marinelli**, V. Negnevitsky, J.P. Home
Science 347, 6217, 53-56 (2015)

PEER REVIEWING ACTIVITIES

2022- present	Reviewer for Nature Publishing Group
2024- present	Reviewer for APS Phys. Rev X Quantum
