

# Matteo Rosati

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Via Vito Volterra, 62  
00146, Roma, Italia

✉ [matteo.rosati@uniroma3.it](mailto:matteo.rosati@uniroma3.it)  
[ORCID,gscholar](#)



## Esperienza accademica

- 09/2022 **Ricercatore (RTDa) - Università Roma Tre.**
- 05/2022 **Einstein International Postdoctoral Fellow - Technische Universität Berlin.**
- 01-04/2022 **Postdoc - Universitat Autònoma de Barcelona.**
- 2020–2021 **Marie Skłodowska Curie (MSC) Fellow - Universitat Autònoma de Barcelona,**  
*Supervisore: Prof. A. J. Winter, ICREA.*
- 2017–2019 **Postdoc - Universitat Autònoma de Barcelona.**

## Educazione

- 2014–2017 **Ph.D. in Fisica cum laude,**  
*Supervisore: Prof. V. Giovannetti, Scuola Normale Superiore, Pisa, Italia,*  
Tesi Finale: “Protocolli di Decodifica per Comunicazione Classica su Canali Quantistici”.
- 2012–2014 **Laurea Magistrale in Fisica Teorica cum laude,**  
*Supervisore: Prof. G. Parisi, Università “La Sapienza”, Roma, Italia,*  
Tesi Finale: “Studio di un modello realistico di Vetro Strutturale in Campo Medio”.
- 2009–2012 **Laurea Triennale in Fisica cum laude,**  
*Supervisore: Prof. G. Parisi, Università “La Sapienza”, Roma, Italia,*  
Tesi Finale: “Connessione Preferenziale nelle Reti Complesse”.
- 2004–2009 **Diploma di Maturità Scientifica cum laude, Liceo Scientifico “Farnesina”, Roma, Italia.**

## Finanziamenti e riconoscimenti accademici

- 2023-2025 **Young Researchers MSCA - Ministero dell’Università e della Ricerca ([link](#)),**  
Ruolo: beneficiario e Principal Investigator (PI).
- 2022-2026 **Einstein International Postdoctoral Fellowship - Einstein Foundation ([EF](#)),**  
Ruolo: beneficiario, ricercatore e co-PI. PI: A. Pappa.
- 2022-2025 **Juan de la Cierva Incorporación - Ministerio de Ciencia y Innovación, Spain ([link](#)),**  
Ruolo: beneficiario e ricercatore. PI: A. Winter.
- 2022-2024 **Quantum Information Campaign - Agenzia Spaziale Europea ([ESA](#)),**  
Ruolo: beneficiario, ricercatore e PI. co-PI's: A. Winter, J. Calsamiglia.
- 2020-2022 **Marie Skłodowska-Curie Fellowship - Commissione Europea ([link](#)),**  
Progetto n. 845255-QUAIL, “Quantum Information Learning”.  
Ruolo: beneficiario e ricercatore. PI: A. Winter.
- 2020-2022 **Finanziamenti di gruppo - Ministerio de Ciencia, Innovacion y Universidades, Spain,**  
Progetto PID2019-107609GB-I00.  
Ruolo: ricercatore e responsabile di un pacchetto di lavoro. PI: R. Munoz, J. Calsamiglia.

- 2017-2021 **Finanziamenti di gruppo - MINECO, Spain,**  
Progetti FIS2016-80681, FIS2013-40627-P.  
Ruolo: ricercatore. PI's: R. Munoz, J. Calsamiglia, A. Sanpera, A. Winter.
- 2014-2017 **Borsa di Perfezionamento (PhD) - Scuola Normale Superiore di Pisa.**

### Abilitazione all'insegnamento accademico

- 2021 **Abilitazione Scientifica Nazionale SC 01/A4 SSD MAT/07, Fisica Matematica II Fascia,**  
Ministero dell'Università e della Ricerca, Italia.
- 2021 **Professore Lettore,** Agenzia per la Qualità del Sistema Universitario della Catalogna, Spagna.

### Periodi di visita in gruppi di ricerca internazionali

- 12/2023 **Universitat Autònoma de Barcelona,**  
*Quantum Information Group, Prof. A. Winter.*
- 11/2022 **Technische Universität München,**  
*Theoretical Quantum System Design Group, Prof. J. Nötzl.*
- 10/2019 **Hong Kong University,**  
*Quantum Information and Computation Initiative, Prof. G. Chiribella.*
- 02/2020 **Scuola Normale Superiore di Pisa,**  
*Quantum Information Group, Prof. V. Giovannetti.*
- 07/2017 **Universitat Autònoma de Barcelona,**  
*Quantum Information Group, Prof. A. Winter.*
- 03/2017 **Max Planck Institut for Quantum Optics Garching,**  
*Theory Division, Prof. I. Cirac.*

### Attività di referee

- 2022-ongoing **Bandi competitivi internazionali.**  
Marie Skłodowska-Curie Actions 2022.
- 2019-ongoing **Conferenze scientifiche internazionali.**  
QIP 2023, QCRYPT 2022, QIP 2019.
- 2018-ongoing **Riviste scientifiche internazionali.**  
Phys. Rev. Lett., Quantum Journal, Phys. Rev. X Quantum, Phys. Rev. Res., Phys. Rev. A, IEEE J. Sel. Areas Commun.: special issue Quant. Inf. Science, J. Phys. A, New J. Phys., Phil. Trans. A., Ann. Phys., Eur. J. Phys.

### Organizzazione di eventi scientifici internazionali

- 2021/22 **2nd Workshop on Entanglement-Assisted Communication Networks (EACN),**  
Physikzentrum DFG, Bad Honnef, Germany.  
Technical Program Committee, Local Organization Committee.

### Lingue

Italiano: madre lingua. Inglese: avanzato C1 (Cambridge CAE). Tedesco: intermedio B2 (Goethe Zertifikat). Spagnolo: intermedio B2. Francese: base A2. Cinese: base A1 (HSK2).

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## Lista delle pubblicazioni e preprint

- 1. Learning quantum processes without input control.**  
M. Fanizza, Y. Quek and M. Rosati, preprint [arXiv:2211.05005](#).
- 2. A learning theory for quantum photonic processors and beyond.**  
M. Rosati, preprint [arXiv:2209.03075](#).
- 3. Reducing energy consumption of fiber networks via quantum communication technology.**  
J. Nötzel and M. Rosati, preprint [arXiv:2201.12397](#).
- 4. Squeezing-enhanced communication on phase-noise channels.**  
M. Fanizza, M. Rosati, M. Skotiniotis, J. Calsamiglia, V. Giovannetti, [Quantum 5, 608 \(2021\)](#).
- 5. Reinforcement-learning calibration of coherent-state receivers on variable-loss optical channels.**  
M. Bilkis, M. Rosati, J. Calsamiglia, [Proc. 2021 IEEE ITW, 1 \(2021\)](#).
- 6. Compound Channel Capacities under Energy Constraints and Application.**  
A. Cacioppo, J. Nötzel and M. Rosati, [Proc. 2021 IEEE ISIT, 640 \(2021\)](#).
- 7. Performance of coherent frequency-shifted keying for classical communication on quantum channels.**  
M. Rosati, [Proc. 2021 IEEE ISIT, 902 \(2021\)](#).
- 8. Performance of Gaussian encodings for classical communication on correlated quantum phase-noise channels.**  
M. Fanizza, M. Rosati, M. Skotiniotis, J. Calsamiglia, V. Giovannetti, [Proc. 2020 IEEE ISIT, 1830 \(2020\)](#).
- 9. Real-time calibration of coherent-state receivers: learning by trial and error.**  
M. Bilkis, M. Rosati, R. Morral Yepes, J. Calsamiglia, [Phys. Rev. Res. 2, 033295 \(2020\)](#).
- 10. Beyond the swap test: optimal estimation of quantum state overlap.**  
M. Fanizza, M. Rosati, M. Skotiniotis, J. Calsamiglia, V. Giovannetti, [Phys. Rev. Lett. 124, 060503 \(2020\)](#).
- 11. Accessible coherence in open quantum system dynamics.**  
M. G. Díaz, B. Deseff, M. Rosati, D. Egloff, J. Calsamiglia, A. Smirne, M. Skotiniotis, S. F. Huelga, [Quantum 4, 249 \(2020\)](#).
- 12. Using and reusing coherence to realize quantum processes.**  
M. G. Díaz, K. Fang, X. Wang, M. Rosati, M. Skotiniotis, J. Calsamiglia, A. Winter, [Quantum 2, 100 \(2018\)](#).
- 13. Narrow Bounds for the Quantum Capacity of Thermal Attenuators.**  
M. Rosati, A. Mari and V. Giovannetti, [Nat. Comm. 9, 4339 \(2018\)](#).
- 14. Asymmetric information capacities of reciprocal pairs of quantum channels.**  
M. Rosati and V. Giovannetti, [Phys. Rev. A 97, 052318 \(2018\)](#).
- 15. Capacity of coherent-state adaptive decoders with interferometry and single-mode detectors.**  
M. Rosati, A. Mari and V. Giovannetti, [Phys. Rev. A 96, 012317 \(2017\)](#).

16. **Optimal quantum state discrimination via nested binary measurements.**  
M. Rosati, G. De Palma, A. Mari and V. Giovannetti, [Phys. Rev. A \*\*95\*\*, 042307 \(2017\)](#).
17. **Multi-Phase Hadamard receivers for classical communication on lossy bosonic channels.**  
M. Rosati, A. Mari and V. Giovannetti, [Phys. Rev. A \*\*94\*\*, 062325 \(2016\)](#).
18. **Coherent-state discrimination via non-heralded probabilistic amplification.**  
M. Rosati, A. Mari and V. Giovannetti, [Phys. Rev. A \*\*93\*\*, 062315 \(2016\)](#).
19. **Achieving the Holevo bound via a bisection decoding protocol.**  
M. Rosati and V. Giovannetti, [J. Math. Phys. \*\*57\*\*, 062204 \(2016\)](#).

## Attività di relatore in seminari e visite di ricerca, conferenze, workshop e scuole scientifiche internazionali

2022

- invited talk, **A learning theory for quantum photonic processors and beyond**, Quantum Information research visit Group, Universitat Autònoma de Barcelona, Spain.
- contrib. talk **Learning quantum channels without input control**, [Beyond IID in Information Theory 10](#), Southern University of Science and Technology, Shenzhen, China (online).
- contrib. talk **A learning theory for quantum photonic processors and beyond**, [14th Italian Quantum Information Symposium](#), University of Palermo, Italy.
- contrib. talk **Fiber communication with collective quantum measurements: a machine learning perspective with applications**, [Deutsche Physikalische Gesellschaft \(DPG\) Meeting](#), University of Regensburg, Germany.
- contrib. talk **Learning variable quantum processes**, [Deutsche Physikalische Gesellschaft \(DPG\) Meeting](#), University of Regensburg, Germany.

2021

- invited talk, **Squeezing-enhanced communication without a phase reference**, [Lehrstuhl für Theoretische Informationstechnik](#), Technische Universität Munich.
- invited talk, **Quantum Information Theory with bosonic Gaussian systems and beyond**, [Lehrstuhl für Theoretische Informationstechnik](#), Technische Universität Munich.
- contrib. talk **Reinforcement-learning calibration of coherent-state receivers on variable-loss optical channels**, [IEEE Information Theory Workshop](#), Kanazawa, Japan (online).
- contrib. talk **Squeezing-enhanced communication without a phase reference**, [Deutsche Physikalische Gesellschaft \(DPG\) Meeting](#), Technical University Kaiserslautern, Germany (online).
- contrib. talk **Classical capacity of quantum Gaussian codes: when squeezing helps**, [Quantum Optics X](#), University of Warsaw, Torun, Poland (hybrid).
- contrib. talk **Compound Channel Capacities under Energy Constraints and Application**, [IEEE International Symposium on Information Theory](#), Sidney (online).
- by co-author contrib. talk **Performance of coherent frequency-shifted keying for classical communication on quantum channels**, [IEEE International Symposium on Information Theory](#), Sidney (online).
- invited talk **High-rate classical communication on quantum channels**, [Quantum Communication and Cryptography Group](#), Technische Universität, Berlin (online).
- invited talk **Achieving high-data-rate communication on optical quantum channels**, [Workshop on Entanglement Assisted Communication Networks](#), Technische Universität, Munich (online).
- contrib. talk **Real-time calibration of coherent-state receivers: learning by trial and error**, [Machine Learning for Quantum](#), Heriot-Watt University, Edinburgh (online).

- contrib. talk **Beyond the swap test: optimal estimation of quantum state overlap**, [Quantum Information Days](#), Center for Theoretical Physics, Warsaw (online).  
2020
- invited talk **Achieving high-data-rate communication on optical quantum channels**, [Lehrstuhl für Theoretische Informationstechnik](#), Technische Universität, Munich (online).
- contrib. talk **Classical capacity of quantum Gaussian codes: when squeezing helps**, [Q-Turn: changing paradigms in quantum science](#) (online).
- lightning talk by co-author **Classical capacity of quantum Gaussian codes without a phase reference: when squeezing helps**, [Beyond IID in Information Theory 8](#), Stanford (online).
- contrib. talk by co-author **Beyond the swap test: optimal estimation of quantum state overlap**, [15th Conference on the Theory of Quantum Computation, Communication and Cryptography](#), Latvia (online).
- contrib. talk **Performance of Gaussian encodings for classical communication on correlated quantum phase-noise channels**, [IEEE International Symposium on Information Theory](#), Los Angeles (online).
- invited talk **Real-time calibration of coherent-state receivers: learning by trial and error**, [Centre for Quantum Optical Technologies](#), Warsaw (online).
- invited talk, research visit **Using and reusing coherence to realize quantum processes**, [Scuola Normale Superiore](#), Pisa.  
2019
- invited talk, research visit **Using and reusing coherence to realize quantum processes**, [Quantum Information and Computation Initiative](#), Hong Kong University.
- contrib. talk **Using and reusing coherence to realize quantum processes**, [5th Conference on Quantum Information in Spain](#), Barcelona.  
2018
- invited talk **Narrow bounds for the quantum capacity of thermal attenuators**, [New Quantum Horizons: from Foundations to Biology](#), INFN Frascati.
- poster **The capacity of coherent-state adaptive decoders with interferometry and single-mode detectors**, [Quantum Controlled Ultrafast Multimode Entanglement and Measurement](#), Oxford.
- poster **Using and reusing coherence to realize quantum processes**, [4th Seefeld workshop on Quantum Information](#), Austria.  
2017
- contrib. talk **Optimal quantum state discrimination via nested binary measurements**, [10th Italian Quantum Information Science Conference](#), Florence.
- poster **The capacity of coherent-state adaptive decoders with interferometry and single-mode detectors**, [Beyond I.I.D. in Information Theory](#), Singapore.
- invited talk, research visit **Decoding protocols for classical communication on quantum channels**, Quantum Information group, Universitat Autònoma de Barcelona.
- poster **The capacity of coherent-state adaptive decoders with interferometry and single-mode detectors**, [24th Central European Workshop on Quantum Optics](#), DTU Lyngby, Denmark.
- poster **The capacity of coherent-state adaptive decoders with interferometry and single-mode detectors**, [Solstice of Foundations](#), ETH Zurich.
- poster **The capacity of coherent-state adaptive decoders with interferometry and single-mode detectors**, [Theory of Quantum Computation, Communication and Cryptography](#), Paris.
- invited talk, research visit **Decoding protocols for classical communication on quantum channels**, Quantum Information group, Max-Planck-Institut für Quantenoptik, Garching.  
2016

- poster **Coherent-state discrimination via non-heralded probabilistic amplification**, [International Conference on Quantum Communication, Measurement and Computing \(QCMC\)](#), Singapore.
- poster **Coherent-state discrimination via non-heralded probabilistic amplification**, [23rd Central European Workshop on Quantum Optics \(CEWQO\)](#), Kolymbari, Crete.
- poster **Coherent-state discrimination via non-heralded probabilistic amplification**, [619. Wilhelm und Else Heraeus-Seminar: Quantum Speed Limits](#), Bad Honnef, Germany.

2015

- contrib. talk **Achieving the Holevo bound via a bisection decoding protocol**, [Non-Markovian Quantum Dynamics Workshop](#), Cortona, Italy.
- poster **Achieving the Holevo bound via a bisection decoding protocol**, [Quantum Key Distribution Summer School](#), IQC, Waterloo, Canada.
- poster **Achieving the Holevo bound via a bisection decoding protocol**, [Scientific School in Integrated Quantum Photonics Applications: from Simulation to Sensing](#), Rome, Italy.
- poster **Achieving the Holevo bound via a bisection decoding protocol**, [12th Central European Quantum Information Processing Workshop \(CEQIP\)](#), Telc, Czech Republic.