

# Alessandro Santini

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## Education

- 2020 – October 2024 📖 **Ph.D., Scuola Internazionale Superiore di Studi Avanzati (SISSA)**  
Ph.D. in Theory and Numerical Simulation of Condensed Matter  
Thesis title: *Advanced Perspectives in Non-Equilibrium Quantum Dynamics*
- 2018 – 2020 📖 **M.Sc., Physics and Astrophysics, Università degli Studi di Firenze**  
Thesis title: *Coarse-grained dynamics in long-range interacting systems.*
- 2014 – 2018 📖 **B.Sc., Physics and Astrophysics Università degli Studi di Firenze**  
Thesis title: *Linear theory of kinetic roughening .*
- 2010 – 2018 📖 **Diploma (V.O.) in Pianoforte**  
Conservatorio di Musica Luigi Cherubini, Firenze

## Experience

- 2024 November – Ongoing 📖 **Postdoc position Polytechnic Institute of Paris**
- 2022 – October 2024 📖 **Member of the Board of Directors**  
Student Representative in SISSA's Board of Directors.
- 2023 – October 2024 📖 **Student Representative in CUG**  
Representative in SISSA wellbeing and equal opportunities committee
- 2019 – October 2024 📖 **Student Collaboration Activities**  
Involved in collaborative student initiatives, including teaching support, administrative tasks, seminar coordination and web-page maintenance.

## Skills

- Languages 📖 **Italian:** Native  
**English:** Proficient  
**French:** Basic
- Coding 📖 Python, C++, Julia, Qiskit, Tenpy, ITensors, Stim,  $\LaTeX$ , GitHub, SLURM

## Awards

- 2023 📖 Ermenegildo Zegna Founder's Scholarship (2023)
- 2020 📖 Best Poster Award, New Trends in Complex Quantum Systems Dynamics, (2022)

## Attended Workshops, Schools and Visiting Periods

- 2024 📖 Seminar on "Hybrid Stabilizer Tensor Network Algorithms", 16th Italian Quantum Information Science Conference
- 📖 Seminar on "Quantum Trajectories and Probability Distributions: Uncovering the Dynamics of Monitored Quantum Many-body Systems", IV Convegno SIFS
- 2023 📖 Seminar on "Quantum Work Statistics in Quadratic Fermionic Models: Noncommutativity and Nonclassicality" Young Seminars SIFS, 12th October 2023
- 📖 Visiting Period - LPTM - Laboratory of Theoretical Physics and Modelling CY Cergy Paris Université, CNRS, and - LPTMS - Laboratoire de physique théorique et modèles statistiques, Université Paris-Saclay, CNRS ( Sep. 2023 —Dec.2023 )
- 📖 3rd plenary meeting of the International Quantum Tensor Network, TUM Akademiezentrum Raitenhaslach, Burghausen (2023)
- 📖 Quantum thermodynamics conference (QTD 2023), TU Wien's Kuppelsaal, Vienna, (2023)
- 📖 OPEN QMBP, Institut Pascal, Université Paris-Saclay (2023)
- 2022 📖 New Trends in Complex Quantum Systems Dynamics, Centro Carlos Santamaría Campus de Gipuzkoa de UPV/EHU, Donostia (2022)
- 2021 📖 Convegno della Società Italiana di Fisica Statistica - SIFS, XXV Convegno Nazionale di Fisica Statistica e dei Sistemi Complessi, Parma (2021)
- 📖 SFT 2021 - Lectures on Statistical Field Theories GGI postgraduate school 8-19 February 2021
- 2020 📖 SFT 2020 - Lectures on Statistical Field Theories GGI postgraduate school 3-14 February 2020
- 2018 📖 Workshop on Teaching and Learning Statistical Physics, Montepulciano (2018)

## Research Publications

### Publications in peer-reviewed scientific journals

- 1 N. Ranabhat, A. Santini, E. Tirrito, and M. Collura, "Dynamical deconfinement transition driven by density of excitations," *Phys. Rev. B*, vol. 111, p. 024 304, 2 Jan. 2025. [DOI: 10.1103/PhysRevB.111.024304.](#)
- 2 L. Guglielmo, A. Santini, and M. Collura, "Continuously monitored quantum systems beyond Lindblad dynamics," *New Journal of Physics*, 2024. [DOI: 10.1088/1367-2630/ad1f0a.](#)
- 3 A. F. Mello, A. Santini, and M. Collura, "Hybrid stabilizer matrix product operator," *Phys. Rev. Lett.*, vol. 133, p. 150 604, 15 Oct. 2024. [DOI: 10.1103/PhysRevLett.133.150604.](#)
- 4 A. Santini, A. Solfanelli, S. Gherardini, and M. Collura, "Work statistics, quantum signatures, and enhanced work extraction in quadratic fermionic models," *Phys. Rev. B*, vol. 108, p. 104 308, 10 Sep. 2023. [DOI: 10.1103/PhysRevB.108.104308.](#)
- 5 A. Santini, A. Solfanelli, S. Gherardini, and G. Giachetti, "Observation of partial and infinite-temperature thermalization induced by repeated measurements on a quantum hardware," *Journal of Physics Communications*, 2023. [DOI: 10.1088/2399-6528/acdd4f.](#)
- 6 E. Tirrito, A. Santini, R. Fazio, and M. Collura, "Full counting statistics as probe of measurement-induced transitions in the quantum Ising chain," *SciPost Phys.*, vol. 15, p. 096, 2023. [DOI: 10.21468/SciPostPhys.15.3.096.](#)
- 7 L. Capizzi, G. Giachetti, A. Santini, and M. Collura, "Spreading of a local excitation in a quantum hierarchical model," *Phys. Rev. B*, vol. 106, p. 134 210, 13 Oct. 2022. [DOI: 10.1103/PhysRevB.106.134210.](#)

- 8 A. Santini, G. Giachetti, and L. Casetti, "Violent relaxation in the hamiltonian mean field model: Ii. non-equilibrium phase diagrams," *Journal of Statistical Mechanics: Theory and Experiment*, vol. 2022, no. 1, p. 013 210, 2022. [DOI: 10.1088/1742-5468/ac4516](https://doi.org/10.1088/1742-5468/ac4516).
- 9 A. Santini, G. E. Santoro, and M. Collura, "Clean two-dimensional floquet time crystal," *Phys. Rev. B*, vol. 106, p. 134 301, 13 Oct. 2022. [DOI: 10.1103/PhysRevB.106.134301](https://doi.org/10.1103/PhysRevB.106.134301).
- 10 A. Santini and V. Vitale, "Experimental violations of leggett-garg inequalities on a quantum computer," *Phys. Rev. A*, vol. 105, p. 032 610, 3 Mar. 2022. [DOI: 10.1103/PhysRevA.105.032610](https://doi.org/10.1103/PhysRevA.105.032610).
- 11 A. Solfanelli, A. Santini, and M. Campisi, "Quantum thermodynamic methods to purify a qubit on a quantum processing unit," *AVS Quantum Science*, vol. 4, no. 2, p. 026 802, Jun. 2022, ISSN: 2639-0213. [DOI: 10.1116/5.0091121](https://doi.org/10.1116/5.0091121). eprint: <https://pubs.aip.org/avs/aqs/article-pdf/doi/10.1116/5.0091121/16493704/026802\1\online.pdf>.
- 12 A. Solfanelli, A. Santini, and M. Campisi, "Experimental verification of fluctuation relations with a quantum computer," *PRX Quantum*, vol. 2, p. 030 353, 3 Sep. 2021. [DOI: 10.1103/PRXQuantum.2.030353](https://doi.org/10.1103/PRXQuantum.2.030353).
- 13 G. Giachetti, A. Santini, and L. Casetti, "Coarse-grained collisionless dynamics with long-range interactions," *Phys. Rev. Res.*, vol. 2, p. 023 379, 2 Jun. 2020. [DOI: 10.1103/PhysRevResearch.2.023379](https://doi.org/10.1103/PhysRevResearch.2.023379).
- 14 A. Santini and P. Politi, "Learning universality and scaling from simple deposition models," *American Journal of Physics*, vol. 86, no. 8, pp. 616–621, Aug. 2018, ISSN: 0002-9505. [DOI: 10.1119/1.5041372](https://doi.org/10.1119/1.5041372).

## Preprints

- 1 A. F. Mello, A. Santini, G. Lami, J. D. Nardis, and M. Collura, *Clifford dressed time-dependent variational principle*, 2024. arXiv: 2407.01692 [quant-ph]. [URL: https://arxiv.org/abs/2407.01692](https://arxiv.org/abs/2407.01692).
- 2 A. Santini, L. Lumia, M. Collura, and G. Giachetti, *Semiclassical quantum trajectories in the monitored lipkin-meshkov-glick model*, 2024. arXiv: 2407.20314 [quant-ph]. [URL: https://arxiv.org/abs/2407.20314](https://arxiv.org/abs/2407.20314).

## Books and Chapters

- 1 M. Collura, G. Lami, N. Ranabhat, and A. Santini, *Tensor Network Techniques for Quantum Computation*. SISSA Medialab Srl, 2024.