Salvatore D. Pace

Curriculum Vitae

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Education

Massachusetts Institute of Technology — September 2021 - Present
- Ph.D. in Physics — GPA: 5.00/5.00
- Advisor: Xiao-Gang Wen

University of Cambridge (Churchill Scholar) — October 2020 - August 2021
- MPhil in Physics
- Thesis: Emergent Axions in U(1) Quantum Spin Liquids
- Advisor: Claudio Castelnovo

Boston University — September 2016 - May 2020
- B.A. *with honors* in Physics & M.A. in Physics — GPA: 4.00/4.00
- Thesis: The Fine Structure Constant in Quantum Spin Ice
- Advisor: Chris Laumann

Selected Awards and Honors

- KITP Graduate Fellowship — October 2024
- APS LeRoy Apker Award Finalist — June 2020
- National Science Foundation Graduate Research Fellowship — March 2020
- Churchill Scholarship — January 2020
- Learning Assistant of the Year — May 2019
- Goldwater Scholarship — April 2019

Scientific Papers

[16] Salvatore D. Pace, Minho Luke Kim, Arkya Chatterjee, and Shu-Heng Shao, *Parity anomaly from LSM: exact valley symmetries on the lattice*, arXiv:2505.04684

[15] Salvatore D. Pace, Arkya Chatterjee, and Shu-Heng Shao, *Lattice T-duality from non-invertible symmetries in quantum spin chains*, SciPost Phys. **18**, 121 (2025)

[14] Salvatore D. Pace, Ho Tat Lam, and Ömer M. Aksoy, *(SPT-)LSM theorems from projective non-invertible symmetries*, SciPost Phys. **18**, 028 (2025)

[13] Salvatore D. Pace, Guilherme Delfino, Ho Tat Lam, and Ömer M. Aksoy *Gauging modulated symmetries: Kramers-Wannier dualities and non-invertible reflections*, SciPost Phys. **18**, 021 (2025)

[12] Arkya Chatterjee, Salvatore D. Pace, and Shu-Heng Shao, *Quantized axial charge of staggered fermions and the chiral anomaly*, Phys. Rev. Lett. **134**, 021601 (2025)

[11] Salvatore D. Pace, Chenchang Zhu, Agnès Beaudry, and Xiao-Gang Wen *Generalized symmetries in singularity-free nonlinear σ models and their disordered phases*, Phys. Rev. B **110**, 195149 (2024)

[10] Salvatore D. Pace *Emergent generalized symmetries in ordered phases and applications to quantum disordering*, SciPost Phys. **17**, 080 (2024)

[9] Salvatore D. Pace and Yu Leon Liu *Topological aspects of brane fields: Solitons and higher-form symmetries*, SciPost Phys. **16**, 128 (2024)

[8] Salvatore D. Pace and Xiao-Gang Wen, *Exact emergent higher-form symmetries in bosonic lattice models*, Phys. Rev. B **108**, 195147 (2023)

[7] Yun-Tak Oh, Salvatore D. Pace, Jung Hoon Han, Yizhi You, and Hyun-Yong Lee, *Aspects of $\mathbb{Z}_N$ rank-2 gauge theory in $(2+1)$ dimensions: Construction schemes, holonomies, and sublattice one-form symmetries*, Phys. Rev. B **107**, 155151 (2023)

[6] Salvatore D. Pace, Claudio Castelnovo, and Chris R. Laumann, *Dynamical Axions in $U(1)$ Quantum Spin Liquids*, Phys. Rev. Lett. **130**, 076701 (2023)

[5] Salvatore D. Pace and Xiao-Gang Wen, *Emergent higher-symmetry protected topological orders in the confined phase of $U(1)$ gauge theory*, Phys. Rev. B **107**, 075112 (2023)

[4] Salvatore D. Pace and Xiao-Gang Wen, *Position-dependent excitations and UV/IR mixing in the $\mathbb{Z}_N$ rank-2 toric code and its low-energy effective field theory*, Phys. Rev. B **106**, 045145 (2022)

[3] Salvatore D. Pace, Siddhardh C. Morampudi, Roderich Moessner, and Chris R. Laumann, *Emergent Fine Structure Constant of Quantum Spin Ice Is Large*, Phys. Rev. Lett. **127**, 117205 (2021) **[Editors' Suggestion and Featured in Physics]**

[2] Salvatore D. Pace, Kevin A. Reiss, and David K. Campbell, *The β Fermi-Pasta-Ulam-Tsingou Recurrence Problem*, Chaos **29**, 113107 (2019)

[1] Salvatore D. Pace and David K. Campbell, *Behavior and breakdown of higher-order Fermi-Pasta-Ulam-Tsingou recurrences*, Chaos **29**, 023132 (2019) **[Selected as an Editor's Pick]**

Research Presentations

Oral Presentations

- Georgia Tech Seminar
  May 2025 [slides]
  "Lattice T-duality from non-invertible symmetries in quantum spin chains"' (invited)
- KITP GenSym Workshop
  April 2025 [slides] [recording]
  "SPT-LSM theorems from projective non-invertible symmetry" (invited)
- UCSD CMT Seminar
  February 2025 [slides]
  "An SPT-LSM theorem for weak SPTs with non-invertible symmetry"

- UCLA CMT Seminar
  February 2025 [pre-talk notes] [main talk slides]
  "An SPT-LSM theorem for weak SPTs with non-invertible symmetry" (invited)
- Oxford's Symmetry Seminar
  February 2025 [slides] [recording]
  "Lattice T-duality from non-invertible symmetries in quantum spin chains" (invited)
- Effective Field Theory Beyond Ordinary Symmetries, IBS PCS
  November 2024 [slides] [recording]
  "An SPT-LSM theorem for weak SPTs with non-invertible symmetry" (invited)
- Perimeter Institue Seminar
  November 2024 [slides] [recording]
  "An SPT-LSM theorem for weak SPTs with non-invertible symmetry" (invited)
- Ohio State University Quantum Symmetries Seminar
  October 2024 [slides]
  "Generalized symmetries in ordered phases" (invited)
- Harvard CMT Kids Seminar
  October 2024 [slides]
  "An SPT-LSM theorem for weak SPTs with non-invertible symmetry" (invited)
- Applications of Generalized Symmetries and Topological Defects to Quantum Matter, SCGP
  September 2024 [slides] [recording]
  "Interplays of generalized and crystalline symmetries in G-qudit models" (invited)
- Paths to Quantum Field Theory 2024
  July 2024 [slides]
  "Topological holography and spacetime symmetry"
- IHES Summer School – Symmetries and Anomalies: a Modern Take, Seminar
  July 2024 [slides]
  "Non-invertible reflection symmetries in spin chains"
- Boston University CMT Seminar,
  May 2024 [notes]
  "A classification of defect-free disordered phases" (invited)
- American Physical Society March Meeting
  March 2024 [slides]
  "Generalized symmetries and quantum disordering"
- Oxford's Symmetry Seminar
  September 2023 [slides] [recording]
  "Emergent generalized symmetries in ordered phases" (invited)
- American Physical Society March Meeting
  March 2023 [slides]
  "Exact emergent higher-form symmetries"
- Caltech CMT Seminar
  February 2023 [slides]
  "Higher-form symmetries and topological phases"
- Boston University CMT Seminar
  June 2022 [slides]
  "UV/IR Mixing in the $\mathbb{Z}_N$ rank-2 toric code" (invited)

- American Physical Society March Meeting
  March 2021 [slides]
  "The Emergent Fine Structure Constant of Quantum Spin Ice is Large"
- Highly Frustrated Magnetism Conference (wHFM21),
  January 2021 [slides]
  "The Emergent Fine Structure Constant of Quantum Spin Ice is Large"
- MPIPKS Condensed matter seminar,
  November 2020 [slides]
  "The fine structure constant of quantum spin ice" (invited)
- American Physical Society March Meeting,
  March 2020 [slides]
  "The β Fermi-Pasta-Ulam-Tsingou Recurrence Problem"
- Greater Boston Area Stat. Mech. Meeting, *Brandeis University*
  October 2019 [slides]
  "The β Fermi-Pasta-Ulam-Tsingou Recurrence Problem"
- American Physical Society March Meeting,
  March 2019 [slides]
  "Behavior and Breakdown of Higher-Order FPUT Recurrences"
- Dynamical Systems Seminar Series, *Boston University*
  November 2018 [slides]
  "Behavior and Breakdown of Higher-Order FPUT Recurrences" (invited)
- Greater Boston Undergraduate Physics Conference, *MIT*
  November 2018 [slides]
  "Behavior and Breakdown of Higher-Order FPUT Recurrences"

Poster Presentations

- UQM Winter 2025 meeting,
  January 2025 [poster]
  "An SPT-LSM theorem for weak SPTs with non-invertible symmetry"
- Symmetries 2024,
  August 2024 [poster]
  "Non-invertible reflections in quantum spin chains"
- Prospects in Theoretical Physics 2024,
  July 2024 [poster]
  "Generalized symmetries and quantum disordering"
- UQM Winter 2024 meeting,
  January 2024 [poster]
  "Generalized symmetries and quantum disordering"
- Princeton Summer School on Condensed Matter Physics,
  July 2023 [poster]
  "Generalized symmetries in ordered phases: bridging the ordinary and the exotic"
- 22nd annual Undergraduate Research Symposium, *Boston University*
  October 2019 [poster]
  "Recurrences in the β FPUT Chain"
- Greater Boston Undergraduate Physics Conference, *MIT*
  November 2018 [poster]
  "Behavior and Breakdown of Higher-Order FPUT Recurrences"

- 21st annual Undergraduate Research Symposium, *Boston University*
  October 2018 [poster]
  "Behavior and Breakdown of Higher-Order FPUT Recurrences"

Teaching Experience

Massachusetts Institute of Technology

- Two-time guest lecturer of 8.513: Modern Quantum Many-Body Physics — Fall 2023
- Two-time guest lecturer of 8.231: Physics of Solids I — Fall 2022

Boston University

- Undergraduate Teaching Assistant (Learning Assistant)
  - PY406: Electromagnetic Fields and Waves II — Spring 2020
  - PY405: Electromagnetic Fields and Waves I — Fall 2019
  - PY452: Quantum Physics II — Fall 2019
  - PY451: Quantum Physics I — Spring 2019
  - PY410: Statistical Physics & Thermodynamics — Spring 2019
  - PY351: Modern Physics I — Fall 2018
  - PY313: Waves and Modern Physics — Fall 2018
- Guest lecturer of PY410: Statistical Physics & Thermodynamics — Spring 2019

Mentorship and Academic Services

- SciPost referee
- Physical Review referee
- Mentor for Project SHORT — August 2020 - Present
- MIT Physics Graduate Student Council Officer — June 2021 - September 2024
- MIT UROP Supervisor — September 2022 - May 2023
- Mentor for Boston University's PRISM — September 2018 - May 2020