

Salvatore D. Pace

Curriculum Vitae

✉ sdpace4@gmail.com

 [0000-0003-0609-3335](https://orcid.org/0000-0003-0609-3335)

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. <i>with honors</i> 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](#), Ömer M. Aksoy, and Ho Tat Lam, *Spacetime symmetry-enriched SymTFT*, arXiv:24xx.xxxxx (see corresponding [talk](#))
- [15] [Salvatore D. Pace](#), Arkya Chatterjee, and Shu-Heng Shao, *Lattice T -duality from non-invertible symmetries in quantum spin chains*, [arXiv:2412.18606](#)
- [14] [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 \(2024\)](#)
- [13] [Salvatore D. Pace](#), Ho Tat Lam, and Ömer M. Aksoy, *(SPT-)LSM theorems from projective non-invertible symmetries*, [arXiv:2409.18113](#)
- [12] Arkya Chatterjee, [Salvatore D. Pace](#), and Shu-Heng Shao, *Quantized axial charge of staggered fermions and the chiral anomaly*, [arXiv:2409.12220](#)

- [11] [Salvatore D. Pace](#) *Emergent generalized symmetries in ordered phases and applications to quantum disordering*, [SciPost Phys.](#) **17**, 080 (2024)
- [10] [Salvatore D. Pace](#), Guilherme Delfino, Ho Tat Lam, and Ömer M. Aksoy *Gauging modulated symmetries: Kramers-Wannier dualities and non-invertible reflections*, [arXiv:2406.12962](#)
- [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

- Effective Field Theory Beyond Ordinary Symmetries, IBS PCS
November 2024 [\[slides\]](#)
“An SPT-LSM theorem for weak SPTs with non-invertible symmetry” (invited)
- Perimeter Institute 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”
- MPIPES 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

- 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