

# Salvatore D. Pace

## Curriculum Vitae

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✉ [sdpace4@gmail.com](mailto:sdpace4@gmail.com)

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

### Education

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|---|----------------------------|
| Massachusetts Institute of Technology                     | September 2021 - Present   |
| • Ph.D. in Physics  | GPA: 5.00/5.00             |
| • Advisor: <a href="#">Xiao-Gang Wen</a>                  |                            |
| University of Cambridge (Churchill Scholarship)           | October 2020 - August 2021 |
| • MPhil in Physics  |                            |
| • Thesis: Emergent Axions in $U(1)$ Quantum Spin Liquids  |                            |
| • Advisor: <a href="#">Claudio Castelnovo</a>             |                            |
| 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: <a href="#">Chris Laumann</a>                  |                            |

### Selected Awards and Honors

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|---|--------------|
| • APS LeRoy Apker Award Finalist                            | June 2020    |
| • BU College Prize for Excellence in the Physics Department | May 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

- [11] [Salvatore D. Pace](#) and Yu Leon Liu *Topological aspects of brane fields: solitons and higher-form symmetries*, arXiv:2311.09293
- [10] [Salvatore D. Pace](#), Chenchang Zhu, Agnès Beaudry, and Xiao-Gang Wen *Generalized symmetries in singularity-free nonlinear  $\sigma$ -models and their disordered phases*, arXiv:2310.08554
- [9] [Salvatore D. Pace](#), *Emergent generalized symmetries in ordered phases*, arXiv:2308.05730
- [8] [Salvatore D. Pace](#) and Xiao-Gang Wen, *Exact emergent higher-form symmetries in bosonic lattice models*, arXiv:2301.05261
- [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  $\beta$  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

- [The Symmetry Seminar](#) (invited) September 2023  
"Emergent generalized symmetries in ordered phases and their spontaneous breaking"
- American Physical Society March Meeting March 2023  
"Exact emergent higher-form symmetries"
- Caltech CMT Seminar February 2023  
"Higher-form symmetries and topological phases"
- Boston University CMT Seminar, *Boston University* (invited) June 2022  
"UV/IR Mixing in the  $\mathbb{Z}_N$  rank-2 toric code"
- American Physical Society March Meeting, *Virtual* March 2021  
"The Emergent Fine Structure Constant of Quantum Spin Ice is Large"
- Highly Frustrated Magnetism Conference (wHFM21), *Virtual* January 2021  
"The Emergent Fine Structure Constant of Quantum Spin Ice is Large"
- MPIPES Condensed matter seminar, *Virtual* (invited) November 2020  
"The fine structure constant of quantum spin ice"
- American Physical Society March Meeting, *Virtual* March 2020  
"The  $\beta$  Fermi-Pasta-Ulam-Tsingou Recurrence Problem"
- Greater Boston Area Stat. Mech. Meeting, *Brandeis University* October 2019  
"The  $\beta$  Fermi-Pasta-Ulam-Tsingou Recurrence Problem"
- American Physical Society March Meeting, *Boston, MA* March 2019  
"Behavior and Breakdown of Higher-Order FPUT Recurrences"
- Dynamical Systems Seminar Series, *Boston University* (invited) November 2018  
"Behavior and Breakdown of Higher-Order FPUT Recurrences"
- Greater Boston Undergraduate Physics Conference, *MIT* November 2018  
"Behavior and Breakdown of Higher-Order FPUT Recurrences"

## Poster Presentations

- Princeton Summer School on Condensed Matter Physics, July 2023  
“Generalized symmetries in ordered phases: bridging the ordinary and the exotic”
- 22nd annual Undergraduate Research Symposium, *Boston University* October 2019  
“Recurrences in the  $\beta$  FPUT Chain”
- Greater Boston Undergraduate Physics Conference, *MIT* November 2018  
“Behavior and Breakdown of Higher-Order FPUT Recurrences”
- 21st annual Undergraduate Research Symposium, *Boston University* October 2018  
“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

- MIT UROP Supervisor September 2022 - May 2023
- [MIT Physics Graduate Student Council](#) Officer June 2021 - Present
- Mentor for [Project SHORT](#) August 2020 - Present
- Mentor for [Boston University's PRISM](#) September 2018 - May 2020