



Personal Data

Nationality **Puerto Rico**, *U.S. Citizen, E.U. Citizen (Spanish)*
Language Fluent: English, Spanish; Intermediate: French, German; Beginner: Japanese
Programming C++, Python (Manim), Prolog, Mathematica, L^AT_EX, HTML

Education

Exp. 2027 **The Ohio State University**, *Ph.D. in theoretical mathematics*, Advisor: David Penneys
2023 **The Ohio State University**, *M.S. in theoretical mathematics*, Advisor: David Penneys
2020 **University of Puerto Rico, Mayagüez Campus**, *B.S. in pure mathematics, minor in computational linguistics*

Research Experience

2025 **JSPS**, *Japan Society for the Promotion of Science*, summer 2025 fellow, Advisor: Yasuyuki Kawahigashi
2023 **DHC**, *Dagger Higher Categories workshop*, hosted by the Perimeter Institute for Theoretical Physics
2022 **CRM**, *Centre de Recherches Mathématiques*, concentration month, on the topic of Quantum symmetries: Tensor categories, Topological quantum field theories, Vertex algebras
2022 **AIM**, *American Institute of Mathematics*, workshop on Higher categories and topological order
2020 **GOALS**, *Groundwork for Operator Algebras Lecture Series*, student participant
2019 **SROP**, *Summer Research Opportunities Program*, at the Ohio State University

Teaching Experience

2024 **Calculus III**, *MATH 2153 at the Ohio State University*, graduate teaching associate
2023 **Calculus I**, *MATH 1151 at the Ohio State University*, graduate teaching associate
2023 – 2024 **MSLC**, *Mathematics and Statistics Learning Center*, at the Ohio State University, mathematics tutor
2017 – 2018 **Rumbo Ex**, *tutoring center at the University of Puerto Rico*, mathematics advisor

Mentoring Experience

2025 – 2026 **Undergraduate Research**, *CYCLE Program*, mentoring undergraduate student Julia Circele
2022 – 2023 **Undergraduate Research**, *CYCLE Program*, mentored undergraduate student Daniel Tcheurekdjian
2023 **REU**, *joint with Anup Poudel and David Penneys*, mentored undergraduate student Jiaqi Lu
2022 **REU**, *ROMUS Program*, joint with David Penneys, mentored undergraduate student Quinn Holt
2019 **REU**, *SAMMS Program*, topology course TA and cohort mentor

Awards

2025-2026 **Patrick S. Osmer Fellowship**, *awarded at the Ohio State University*
2025 **Special Graduate Assignment**, *awarded at the Ohio State University*
2020-2023 **Distinguished University Fellowship**, *awarded at the Ohio State University*
2020 **Karl Friedrich Gauss Award**, *awarded at the University of Puerto Rico - Mayagüez*
2019 **PR-LSAMP research scholarship**, *awarded by the Puerto Rico Louis Stokes Alliance for Minority Participation*

Peer reviewed journal articles

- 2025 Manifestly unitary higher Hilbert spaces (with Chen, Hungar, Penneys, Sanford), accepted by J. Lond. Math. Soc., [arXiv:2410.05120](#)
- 2022 Gray-categories model algebraic tricategories, *Theor. Appl. Categ.* **38** (2022), no. 29, pp 1136-1155, [arXiv:2203.03748](#)
- 2020 Classifying module categories for generalized Temperley-Lieb-Jones \ast -2-Categories (with Hernández-Palomares), *Internat. J. Math.* **31** (2020), no. 04, 2050027, [MR4098904](#), [arXiv:1905.00471](#)
- 2023 3D Koch-type crystals (with Vélez-Santiago), *J. Fractal Geometry* **10** (2023), no. 1/2, pp. 109–149, [arXiv:2302.10628](#)
- 2020 Harmonic gradients on higher dimensional Sierpinski gaskets (with Brown, Mograby, Rogers, and Sangam), *Fractals* **28** (2020), no. 06, 2050108, [arXiv:1908.10539](#)

ArXiv preprints (under review)

- 2026 The Homotopy 3-Type of Abelian C^* -Algebras (with Faurot), [arXiv:2603.29985](#)
- 2024 Dagger n -categories (with Hungar, Johnson-Freyd, Krulewski, Müller, Nivedita, Penneys, Reutter, Scheimbauer, Stehouwer, Vuppulury), [arXiv:2403.01651](#)
- 2024 Foundations for operator algebraic tricategories, [arXiv:2404.05193](#)

Manuscripts (in preparation)

- 2026 **UQSL**, *Unitary Quantum Symmetries Lite textbook* (with Kawagoe and Penneys) [available online](#)
- 2026 Bases for 3-Hilbert spaces and higher unitary duality (with Hungar, Penneys, Wesley)
- 2026 Models for higher Hilbert spaces as homotopy fixed points (with Müller, Penneys, Stehouwer)
- 2026 Knot theoretic model for $\text{Rep}(\mathcal{U}_q(\mathfrak{sl}_4))$ -webs arising from HOMFLY-PT (with Lu and Poudel)
- 2026 A duality theory in the spirit of functional analysis (with Circele)

Select talks (with available slides)

- 2025 **BIMSA**, *Tsinghua Quantum Symmetry Seminar*, invited speaker, Higher Hilbert spaces and their operator algebras [available online](#)
- 2025 **JSPS**, *Japan Society for the Promotion of Science*, poster session, Higher unitary quantum symmetries [available online](#)
- 2025 **QSS**, *Quantum Symmetry Seminar (OSU)*, expository talk, Sheaf theory for the operator algebraist [available online](#)
- 2024 **NCGOA**, *Noncommutative Geometry and Operator Algebras*, speaker, Higher operator algebras [available online](#)
- 2024 **OSLO**, *workshop at the University of Oslo on Quantum groups, tensor categories and quantum field theory*, speaker, Higher functional analysis [available online](#)
- 2023 **DHC**, *Workshop on Dagger Higher Categories*, invited speaker, Operator algebraic tricategories [available online](#)
- 2023 **GPOTS**, *Great Plains Operator Theory Symposium*, speaker, Operator algebraic tricategories [available online](#)
- 2022 **GOALS**, *Groundwork for Operator Algebras Lecture Series seminar*, expository talk, From C^* -algebras to W^* -algebras [available online](#)
- 2021 **OSU**, *Workshop on Minimal modular extensions*, speaker, Braided 2-categories and higher Drinfeld centers [available online](#)