

NICHOLAS SMITH CONNOLLY

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EDUCATION

University of Iowa, Iowa City, IA, United States

- PhD in Mathematics August 2021
- M.S. in Mathematics May 2018

Kenyon College, Gambier, OH, United States

- B.A. in Mathematics and Physics, graduated cum laude May 2015
- Minor in Philosophy, concentration in Scientific Computing

RESEARCH EXPERIENCE

Postdoctoral Researcher at OIST, Quantum Architecture Unit

Research in quantum information theory under Kae Nemoto and Bill Munro 2024 – present
Okinawa, Japan

- Adapted graph theory techniques to quantum communication problems
- Optimized resources for the preparation of quantum graph states

Postdoctoral Researcher at INRIA Paris, COSMIQ Unit

Research in LDPC QEC under Anthony Leverrier and Nicolas Delfosse 2021 – 2023
Paris, France

- Studied and applied quantum error correction algorithms in Python
- Developed a new erasure decoding algorithm for quantum HGP codes

Doctoral Student in Mathematics at the University of Iowa

Research in topology, knot theory, and graph theory under Isabel Darcy 2015 – 2021
Iowa, USA

- Translated theoretical constructions to computational algorithms in C
- Created a prototype SQL database cataloging 2-string tangles

NSF-MSGI Internship at USACE Geospatial Research Laboratory

Research in multi-modal time series data analysis under Charlotte Ellison Summer 2020
(12 weeks)

- Implemented graph techniques in Python to analyze time series data Virginia, USA
- Documented and presented results internally (non-published preprint) (remotely)

Research Internship with Japanese AI startup UsideU

Research in machine learning and AI data analysis under Alireza Goudarzi Summer 2019
(4 weeks)

- Automated AI pipeline in Python for analysis of figure motion data Tokyo, Japan

PI4-IMA Internship with American energy company Ameren

Research in data science and computer vision under Gui Maia Summer 2019
(6 weeks)

- Automated PDF reading in Python using optical character recognition Illinois, USA

Kenyon College Summer Science Scholars Program

Research in classical code construction and error correction under Nuh Aydin Summer 2014
(12 weeks)

- Discovered constructions in Magma for over 150 new optimal codes Ohio, USA

TECHNICAL SKILLS

Proficient	Python, C/C++, SQL, LaTeX
Basic	R, MATLAB, Mathematica, Magma, Maple, Origin, HTML, PHP
Languages	English (native), Japanese (conversational), French (conversational)

PUBLICATIONS AND PREPRINTS

Connolly, N., Nishio, S., Munro, W. J., and Nemoto, K. (2026). Efficient preparation of distance-hereditary graph states via local-Clifford optimization.	preprint 2026
Connolly, N., Nishio, S., and Nemoto, K. (2026). Local equivalence classes of distance-hereditary graphs using split decompositions.	preprint 2026
Nishio, S., Connolly, N. , Piparo, N.L., Munro, W. J., Scruby, T. R., and Nemoto, K. (2025) Multiplexed quantum communication with surface and hypergraph product codes. <i>Quantum</i> , 9, 1613. (https://doi.org/10.22331/q-2025-01-28-1613)	2025
Connolly, N., Londe, V., Leverrier, A., and Delfosse, N. (2022). Fast erasure decoder for hypergraph product codes. <i>Quantum</i> , 8, 1450. (https://doi.org/10.22331/q-2024-08-27-1450)	2024
Connolly, N. (2021). <i>Classification and tabulation of 2-string tangles: The astronomy of subtangle decompositions</i> (Doctoral dissertation, University of Iowa). (https://doi.org/10.17077/etd.005978)	2021
Connolly, N., and Ellison, C. (2020). Multimodal Community Detection Using Multi-Weighted Graphs.	preprint 2020
Aydin, N., Connolly, N. , and Murphree, J. (2017). New binary linear codes from quasi-cyclic codes and an augmentation algorithm. <i>Appl. Algebra Eng. Commun. Comput.</i> , 28, 339–350. (https://doi.org/10.1007/s00200-017-0327-x)	2017
Aydin, N., Connolly, N. , and Grassl, M. (2017). Some results on the structure of constacyclic codes and new linear codes over GF(7) from quasi-twisted codes. <i>Adv. Math. Commun.</i> , 11(1), 245–258. (https://doi.org/10.3934/amc.2017016)	2017

TEACHING AND OUTREACH EXPERIENCE

Regular volunteer with the OIST community outreach section	2024 – present
<ul style="list-style-type: none">Engaged in local scientific outreach events for children in OkinawaPresented science for general audience students hosted by OISTCommunicated core mathematics concepts in English and Japanese	
Graduate teaching assistant in mathematics at the University of Iowa	2015 – 2021
<ul style="list-style-type: none">Taught courses including pre-calculus, calculus, and trigonometryGraded for linear algebra, abstract algebra, and differential equationsWorked as a general mathematics tutor for the univ. tutoring centerReceived the UI Outstanding Teaching Assistant Award (2020)	