

# XINYU (NORAH) TAN

Cambridge, MA 02139

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## EDUCATION

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### Massachusetts Institute of Technology

*Sep. 2022 - Present*

Ph.D., Mathematics

- Advised by Peter Shor and Aram Harrow.
- Mathworks Fellowship 2022-2023.
- Ida M. Green Fellowship 2023, sponsored by MIT Office of Graduate Education.

### Duke University

*Aug. 2018 - Dec. 2021*

B.S., Double Major in Mathematics and Computer Science

GPA: 3.95 / 4.00

- Advised by Robert Calderbank and Jianfeng Lu.
- Graduation with the Highest Distinction in Mathematics.
- Graduation with the Highest Distinction in Computer Science.

## HONORS AND AWARDS

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- 2022 Alex Vasilos Memorial Award, Duke Computer Science Department.
- 2022 Julia Dale Prize, Duke Mathematics Department.
- 2022 Excellence in Research Award, Duke Mathematics Department.
- Runner Up, Computing Research Association's (CRA) Outstanding Undergraduate Researcher Award 2022.
- Duke Faculty Scholar, the highest award given by faculty to undergraduates, one of three recipients in 2021.

## PUBLICATIONS AND CONFERENCES

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1. **X. Tan\***, F. Zhang\*, R. Chao, Y. Shi, and J. Chen, "Scalable surface code decoders with parallelization in time," arXiv preprint (2022): <https://arxiv.org/abs/2209.09219>.
  - Accepted by PRX Quantum.
  - Invited talk at 6th International Conference on Quantum Error Correction (QEC 2023).
2. **X. Tan**, N. Rengaswamy, and R. Calderbank, "Approximate Unitary 3-Designs from Transvection Markov Chains," in *Designs, Codes and Cryptography* (2022), doi: s10.1007/s10623-021-01000-4. arXiv: <https://arxiv.org/abs/2011.00128>.
  - Presented at the 24th Annual Conference on Quantum Information Processing (QIP 2021) poster session;
3. **X. Tan**, J. Hu, Q. Liang, and R. Calderbank, "Grassmannian Packings of Quantum Code Spaces," presented at the 2022 Joint Mathematics Meetings (JMM), AMS Special Session on Recent Advances in Packing II.
4. J. Centers\*, **X. Tan\***, A. Hareedy and R. Calderbank, "Power Spectra of Constrained Codes With Level-Based Signaling: Overcoming Finite-Length Challenges," in *IEEE Transactions on Communications*, vol. 69, no. 8, pp. 4971-4986, Aug. 2021, doi: 10.1109/TCOMM.2021.3073179. arXiv: <https://arxiv.org/abs/2010.04878>.
  - Presented at the 12th Non-Volatile Memories Workshop (NVMW 2021) and selected as a **Memorable Paper Award Finalist** in the ECC and Devices category.
5. **X. Tan**, Y. Li and Y. Gao, "Combining brain-computer interface with virtual reality: Review and prospect," *3rd IEEE International Conference on Computer and Communications (ICCC)*, Chengdu, 2017, pp. 514-518, doi: 10.1109/CompComm.2017.8322599.
  - Received Excellent Presentation Award.

\*: Co-first authorship.

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## WORK EXPERIENCE

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### Alibaba Group U.S. Inc.

*Research Intern*

Bellevue, WA

*May 2022 - Aug. 2022*

- Focused on theoretical study on promising encoding schemes such as topological codes or general quantum LDPC codes; designed and implemented efficient simulation tools for error correction and logical computation tailored for AQL quantum hardware.

### Rhodes Information Initiative at Duke University

*Software Engineer Intern, Supervised by Prof. Ingrid Daubechies*

Durham, NC

*Jan. 2022 - May 2022*

- Developed a website application for art museums to conveniently restore their paintings in a digital manner, which includes removing cracks from their digital image and recoloring the digital image resulted from decay.
- Rewrote the current MATLAB codes with Python for the application to be open-sourced.

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## SERVICES

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### MIT Applied Math Graduate Student Seminar

*Organizer*

Cambridge, MA

*Aug 2023 - Present*

- SPAMS, the Simple Person's Applied Math Seminar, happens weekly featuring talks by graduate students on applied math topics.

### IAS Park City Mathematics Institute (PCMI)

*Graduate Summer School Teaching Assistant*

Park City, Utah

*July 2023 - Aug. 2023*

- Quantum LDPC codes minicourse taught by Nicolas Delfosse.

### Duke Undergraduate Quantum Information Society (DuQIS)

*Co-founder and co-president*

Durham, NC

*May 2020 - Dec. 2021*

- An academic-oriented student organization aiming to promote the accessibility of quantum information science and related research opportunities to more Duke undergraduate students.
- Organize workshops, panels, talks, hackathons, and social events. Read more: <http://duqis.org/event.html>
- Co-instructed Duke Spring and Fall 2021 half-credit House Course 59: Applied Introduction to Quantum Computing.
- Co-instructed 2021 Duke  $\times$  qBraid K12 Quantum Computing Summer School.
- Developed DuQIS website: <http://duqis.org>

### Duke University Mathematics and Computer Science Departments

*Undergraduate Teaching Assistant/Grader*

Durham, NC

*Jan. 2019 - Dec. 2021*

- Math 501\*: Algebraic Structures (Fall 2021)
- Math 212: Multivariable Calculus (Fall 2021, Summer 2021, Fall 2019)
- ECE/CS 250: Computer Architecture (Fall 2019)
- Math 216L: Linear Algebra and Differential Equations (Spring 2021, Spring 2019)

\*: 500 level and above are Graduate Courses

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## SKILLS

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### Programming Language

Python, Java, MATLAB, C, HTML, CSS, JavaScript  
Native in Mandarin, Fluent in English