

# FRANCISCA VASCONCELOS

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## EDUCATION

### University of California Berkeley 2022-Present

**Degree** PhD Student      **Advisors:** Prof. Michael I. Jordan and Prof. Umesh Vazirani      **GPA:** 4.0/4.0  
**Fellowships** National Science Foundation Graduate Research Fellowship (2022-2025)  
 Paul & Daisy Soros Fellowship for New Americans (2024-2026)

### University of Oxford – Rhodes Scholar 2021-2022

**Degree** Master of Studies (MSt) in Philosophy of Physics      **College:** Keble      **Mark:** Pass  
**Tutors** Prof. Owen Maroney, Prof. James Reed, Prof. Oliver Pooley

### University of Oxford – Rhodes Scholar 2020-2021

**Degree** Master of Science (MSc) in Statistical Science      **College:** Keble      **Mark:** Merit  
**Thesis** *Uncertainty in Implicit Neural Representations for Medical Imaging*      **Supervisor:** Prof. Yee Whye Teh

### Massachusetts Institute of Technology Class of 2020

**Degree** BS in Electrical Engineering & Computer Science, Physics      **Humanities Concentration:** Philosophy  
**Honors** Phi Beta Kappa ♦ Tau Beta Pi ♦ Sigma Xi      **Societies:** IEEE ♦ APS ♦ SWE      **GPA:** 4.9/5.0  
**Thesis** *Extending Quantum State Tomography for Superconducting Q. Processors*      **Supervisor:** Prof. William Oliver

### Torrey Pines High School Class of 2016

## PUBLICATIONS

Publications sorted by category and ordered in reverse chronological order, with relevant presentations and awards listed.  
 \* denotes equal contribution or alphabetical ordering. (Note that TCS papers are typically alphabetical order.)

- Journal** ♦ Francisca Vasconcelos\*, Bobby He\*, Nalini Singh, and Yee Whye Teh.  
 “**UncertalNR: Uncertainty Quantification of End-to-End Implicit Neural Representations for Computed Tomography.**”  
*Transactions on Machine Learning Research (TMLR)*, April 2023. [[arXiv:2202.10847](#)] [[Talk](#)] [[Slides](#)] [[Code](#)]  
 ♦ **Oral** (~6% acceptance) at *MedNeurIPS 2021 Workshop* (Virtual) [[Video](#)]  
 ♦ **Poster** at *NeurIPS 2021 Bayesian Deep Learning Workshop* (Virtual) [[Poster](#)]
- ♦ Bharath Kannan, Daniel Campbell, Francisca Vasconcelos, Roni Winik, David Kim, Morten Kjaergaard, Philip Krantz, Alexander Melville, Bethany Niedzielski, Jonilyn Yoder, Terry Orlando, Simon Gustavsson, and William Oliver.  
 “**Generating Spatially Entangled Itinerant Photons with Waveguide Quantum Electrodynamics.**”  
*Science Advances*, Vol. 6, No. 41, 2020. [[arXiv:2003.07300](#)] [[MIT News](#)]
- ♦ Antti Vepsäläinen, Amir Karamlou, John Orrell, Aksunna Dogra, Ben Loer, John Orrell, Francisca Vasconcelos, David Kim, Alexander Melville, Bethany Niedzielski, Jonilyn Yoder, Simon Gustavsson, Joseph Formaggio, Brent VanDevender, and William Oliver.  
 “**Impact of ionizing radiation on superconducting qubit coherence.**”  
*Nature*, Vol. 584, pages 551–556. 2020. [[arXiv:2001.09190](#)] [[MIT News](#)] ♦

- Paper** ◇ Shivam Nadimpall\*, Natalie Parham\*, Francisca Vasconcelos\*, Henry Yuen\*.  
**“On the Pauli Spectrum of QAC<sup>0</sup>.”**  
 In the proceedings of the *56th Annual ACM Symposium on Theory of Computing (STOC), 2024*.  
 ◇ **Talk** at *QIP 2024* (Taipei, Taiwan).  
 ◇ I presented at: Simons Quantum Pod, Berkeley TCS Seminar, QuSoft Seminar. [[Talk](#)] [[Slides](#)]
- ◇ Francisca Vasconcelos and Nuno Vasconcelos.  
**“Person-following UAVs.”**  
 In the proceedings of the *2016 IEEE Winter Conference on Applications of Computer Vision*.
- Article** ◇ Francisca Vasconcelos.  
**“Why Quantum Education?”**  
*SPIE Photonics Focus*, Vol. 4, pages 6-7. May/June 2023.
- ◇ Francisca Vasconcelos.  
**“Quantum Computing @ MIT: The Past, Present, and Future of the Second Revolution in Computing.”**  
 Abridged version in *MIT Undergraduate Research Journal*, Vol. 38, pages 13-24. 2020.  
 Full version on [[arXiv: 2002.05559](#)].
- Poster** ◇ Francisca Vasconcelos, Morten Kjaergaard, Terry Orlando, Simon Gustavsson, and William Oliver.  
**“Extending Quantum State Tomography for Superconducting Quantum Processors.”**  
 In the proceedings of the *2019 MIT MTL Microsystems Annual Research Conference*.  
 ◇ Poster received a **Top-10 Presentation Award** [[Poster](#)]
- Preprint** ◇ Francisca Vasconcelos, Hsin-Yuan Huang  
**“Learning shallow quantum circuits with many-qubit gates.”**  
*Currently Under Review*.  
 ◇ **Talk** at *QTML 2024* (Melbourne, Australia)  
 ◇ I presented at: NYU CQP.
- ◇ Francisca Vasconcelos\*, Emmanouil-Vasileios Vlatakis-Gkaragkounis\*, Panayotis Mertikopoulos, Georgios Piliouras, and Michael I. Jordan.  
**“A Quadratic Speedup in Finding Nash Equilibria of Quantum Zero-Sum Games.”**  
*Currently Under Review*.  
 ◇ **Long Talk** (~6% acceptance) at *QTML 2023* (CERN, Switzerland) [[Slides](#)]

## RESEARCH TALKS

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- 2024** ◇ “**Learning shallow quantum circuits with many-qubit gates**”  
Special seminar (1 hour chalkboard talk) at the NYU Center for Quantum Phenomenon on October 28th.
- ◇ “**On the Pauli Spectrum of QAC<sup>0</sup>**”  
Talk (45 min) at the CWI QuSoft Seminar (virtual) on April 12th.
- ◇ “**On the Pauli Spectrum of QAC<sup>0</sup>**”  
Talk (45 min) at the Berkeley Theory Lunch Seminar at UC Berkeley on March 13th.
- 2023** ◇ “**A Quadratic Speedup for Finding Nash Equilibria of Quantum Zero-Sum Games.**” [[Slides](#)]  
Long talk (~6% acceptance) (30 min) at the 2023 QTML Conference in CERN, Switzerland on November 21st.
- ◇ “**On the Pauli Spectrum of QAC<sup>0</sup>**”  
Simons Institute Quantum Pod Seminar (3 hr whiteboard talk) at UC Berkeley on October 31st.
- 2019** ◇ “**Uncertainty Quantification in End-to-End Implicit Neural Representations for Medical Imaging.**” [[Video](#)]  
Oral (~6% acceptance) (30 min) at the 2021 MedNeurIPS Workshop (Virtual) on December 14th.
- 2016** ◇ “**Person-following UAVs.**” [[Video](#)]  
Talk (5 min) at the 2016 IEEE WACV Conference at Lake Placid, NY on March 10th.

## SELECT AWARDS & HONORS

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- 2024** Played for the Portuguese national lacrosse team in the 2024 Women’s European Lacrosse Championships
- 2022** Oxford University Blues Award “**Highest honour granted to individual sportspeople at the University of Oxford.**”
- 2021** OneQuantum Leading Female Women Quantum Community Creator of the Year Award (Sponsored by QuEra)  
Oxford University Half-Blue Athletic Award
- 2020** Ford Foundation PhD Fellowship Honorable Mention
- 2019** Paul and Daisy Soros Fellowship Finalist  
Hertz PhD Fellowship Regional Finalist  
MIT Churchill Nominee (1 of 2 possible MIT nominees)
- 2018** MIT EECS SuperUROP Draper Laboratory Undergraduate Research and Innovation Scholar  
MIT School of Engineering Barry Goldwater Nominee (2 nominees from MIT each year)  
MIT Society of Women Engineers Outstanding Board Member
- 2017** Minor Planet 33680 (Main-belt Asteroid, discovered 5/13/99 by Lincoln Labs) named “Vasconcelos”
- 2016** Intel International Science & Engineering Fair “Robotics & Intelligent Machines” 2nd Place Grand Award  
Intel International Science & Engineering Fair WebValley Special Award  
Intel Excellence in Computer Science Award  
Greater San Diego Science & Engineering Fair ISEF Sweepstakes Winner (Top 6)  
Southern California Junior Science and Humanities Symposium 1st Place  
Scholastic Gold Key & 3 Honorable Mentions
- 2015** Intel International Science & Engineering Fair “Robotics & Intelligent Machines” 4th Place Grand Award  
Intel International Science & Engineering Fair CERN Special Award  
Intel International Science & Engineering Fair United Technologies Special Awards  
Intel Excellence in Computer Science Award  
Greater San Diego Science & Engineering Fair ISEF Sweepstakes Winner (Top 6)  
2 Scholastic Silver Keys & 2 Honorable Mentions
- 2014** California Senate Award  
National Honor Society (NHS) & National Art Honor Society (NAHS) Inductee  
Trained with Portuguese WU17 National Soccer Team

## SCHOLARSHIPS & FELLOWSHIPS

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- 2024** Paul and Daisy Soros Fellowship for New Americans (\$90,000) - [1st Portuguese recipient of the fellowship.](#)
- 2019** NSF Graduate Research Fellowship  
Rhodes Scholarship\*  
Marshall Scholarship\* [Declined for Rhodes]  
[\\*3rd student in MIT history to receive both the Rhodes and Marshall. \[Reference: Kimberly Benard\]](#)
- 2017-18** Johnson & Johnson MIT Summer Research Fellowship (\$5,520)  
D.E. Shaw Latitude Fellowship (\$1,500)  
Palantir Women in Technology Scholarship (\$7,000)  
SWE GE Women's Network Scholarship (x2, \$10,000)
- 2015-16** SanDisk Scholar (\$10,000)  
Athena Pinnacle Scholarship (\$10,000)  
San Diego AFCEA Scholarship (\$8,000)  
SWE Paula Loring Simon Scholarship (\$1,250)  
San Diego Society of Women Engineers ViaSat Scholarship (\$1,000)  
Professional Engineers in CA Government Fellowship (\$1000)  
Cabrillo Civics Scholarship (\$400)  
National Space Club Foundation Scholarship (\$1,000)  
ISEF+JSHS Awards (\$7,000)

## NEWS

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- 2024** MIT News: [Two from MIT awarded 2024 Paul and Daisy Soros Fellowships for New Americans](#)  
Berkeley CDSS: [Francisca Vasconcelos chosen as Paul and Daisy Soros New American fellow](#)  
PD Soros: [Meet the Class of 2024 Paul & Daisy Soros Fellows](#)  
PD Soros: [Paul & Daisy Soros Fellowships Announce 2024 Class of Distinguished New Americans](#)
- 2022** Cherwell: [Oxford victory at 36th Women's Varsity Football match](#)
- 2020** IBM Research: [IBM and The Coding School to offer free online quantum computing course for 5,000 students](#)  
MIT News: [MIT researchers lead high school educational initiative on quantum computing](#)  
MIT News: [Generating photons for communication in a quantum computing system](#)  
MIT News: [Cosmic rays may soon stymie quantum computing](#)  
MIT News: [MIT chapter of the Phi Beta Kappa Society inducts 115 students from the Class of 2020](#)  
Torrey Pines High School Falconer: [TPHS alumna awarded the Rhodes Scholarship](#)
- 2019** San Diego Union Tribune: [San Diego engineering whiz chosen to be a Rhodes Scholar](#)  
MIT.edu Spotlight: [Five named Rhodes Scholars](#)  
MIT News: [Five MIT students named 2020 Rhodes Scholars](#)  
The Tech: [Four more MIT seniors declared 2020 Rhodes Scholars](#)
- 2017** MIT News: [Adding hands-on practice to science and engineering classes](#)
- 2016** Congressional App Challenge: [#TechTeen – Francisca Vasconcelos](#)  
Congressman Scott Peters: [Quantum App Recognized](#)  
San Diego Union Tribune: [2016 San Diego Science & Engineering Fair Winners](#)  
Society for Science & the Public: [Society Alumni offer advice](#)
- 2015** Society for Science & the Public: [Intel ISEF alumna creates app to explain physics](#)  
Torrey Pines High School Falconer: [One in 2,616: Francisca Vasconcelos](#)  
San Diego Union Tribune: [Science Fair Crowns Contest Winners](#)

## TEACHING EXPERIENCE

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**TCS Qubit x Qubit Intro to Quantum Computing Year-Long Course Instructor** *AY 2020/21, AY 2022/23*  
The Coding School Non-Profit ◊ Co-Instructor with Amir Karamlou

- developed and instructed this first-of-a-kind global, virtual ‘Intro to Quantum Computing’ course
- 8,000+ students, representing 120+ countries, with over 50% students coming from underrepresented backgrounds
- targeted towards young students - only pre-req was high school level geometry
- 99% of students would recommend the course to a friend, 96% of students rated the course as good or excellent
- 96% of students felt more confident in their STEM skills as result of the course

**MIT EECS Intro to Quantum Computing IAP Course Instructor** *Jan 2019, Jan 2020*  
6.s089 ◊ Co-instructor with Amir Karamlou & Megan Yamoah

- 4 week crash course on quantum computing open to MIT community, no quantum mechanics knowledge required
- specifically lectured on quantum algorithms/protocols: Quantum Key Distribution, Grover search, QFT and Shor’s Algo.
- developed QuTip problem set questions and ran tutorials on QuTip and IBM Quantum Experience
- received a 6.7/7 rating on MIT course evaluations (6/20 eligible students responded)

## RESEARCH & TECHNICAL WORK EXPERIENCE

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**Oxford OxCSML Masters Research** *Nov 2020-Present*  
Supervisor: Yee Whye Teh

- project title: “UncertaINR: Uncertainty Quantification in End-to-End Implicit Neural Representations”
- improving reliability of CT image reconstruction, via calibrated implicit neural representations
- study and characterize the relative performance of several Bayesian deep learning approaches

**Microsoft Research Quantum Intern** *May-Aug 2020*  
Supervisor: Marcus DaSilva

- project title: “Learning the Spatial Correlation Structure in Multiqubit Measurement Error” (NDA)

**MIT RLE Engineering Quantum Systems SuperUROP** *June 2018 - May 2020*  
Supervisor: Morten Kjaergaard (Postdoc) ◊ Prof. William Oliver, Terry Orlando, and Simon Gustavsson’s Lab

- expanded lab’s quantum state tomography suite (based on MLE) from 2-qubit to n-qubit systems, improved runtime by 100x
- developing novel QST approach using generative adversarial networks
- programmed an FPGA (with Megan Yamoah) to speed-up lab’s measurement of the quantum computer
- improved speed and computation resources of data analysis code for waveguide QED experiment

**Rigetti Computing Junior Quantum Engineering Intern** *June - August 2019*  
Supervisors: Peter Karalekas, Marcus DaSilva ◊ Full Stack Quantum Engineering Group

- research to improve the algorithmic performance of noisy quantum devices using ensembling techniques from machine learning

**MIT Media Lab Camera Culture UROP** *Sept. 2017 - Sept. 2018*  
Supervisor: Achuta Kadambi (Grad Student) ◊ Prof. Ramesh Raskar’s Lab

- worked on LIDAR to “see through fog,” using 2-laser interferometry
- worked on learning a general transformation to boost ImageNet classification performance of major networks (i.e. AlexNet)

**NASA Jet Propulsion Laboratory (JPL) Engineering Intern** *June 2017 - Aug. 2017*  
Supervisor: Jose Velazco (Researcher) ◊ Ground Communication Group (333K)

- worked with other interns to create “smart” monitoring system for new Deep Space Network amplifiers, consisting of thousands of ESP32s connected to central database and visualization/control webpage
- modified CAD designs of Inter-Satellite Omnidirectional Optical Communicator transmitters for LIDAR functionality

## MIT CSAIL NetMIT UROP

*Oct. 2016 - June 2017*

Supervisors: Deepak Vashit (Grad Student) & Anubhav Jain (MEng) ◊ Prof. Dina Katabi's Lab

- developed an API and “Smart Home” application (smart alarm clock) for the group’s research on wireless location tracking
- developed location data collection iOS application to train neural network to improve localization pattern recognition

## Sidus Solutions Engineering Intern

*June 2015 - Aug. 2015*

San Diego Marine Technology Company

- soldered micro-controllers, programmed GUIs, CADed product parts on Solidworks, fixed broken camera systems, tested products, and laser etched logo information into products

## PROFESSIONAL SERVICE

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**Conference Reviewer:** QIP 2023, QIP 2024, ITCS 2024, TQC 2024, FOCS 2024, QIP 2025

**Journal Reviewer:** IEEE Transactions on Communications

**Seminar Organizer:** Simons Institute Quantum Pod Weekly Seminar (Fall 2024)

## MIT IEEE URTC Conference Chair

*Jan 2017 - Oct 2019*

2018 MIT IEEE Undergraduate Research Technology Conference

- led small group of students to organize 4th IEEE URTC (2018), a 3-day conference (approx. 300 attendees), at Stata Center
- there were 67 posters, 59 papers, and 16 lightning talks with 8 different conference tracks and 5 keynote speakers
- managed almost all logistics including sponsorship, publicity, registration, set-up, attendee housing, etc.
- served as Paper/Posters Chair for the 2017 conference, getting reviewers for all the submissions and keynote speakers
- serving as Conference Advisor for the 2019 conference, guiding the new conference chairs and board

## OUTREACH

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### TCS Qubit x Qubit Founding Academic Program Director

*June 2019 - Present*

The Coding School Non-Profit

- founding member of The Coding School Qubit x Qubit initiative for K-12 quantum education
- created and co-lectured an 8,000+ student global, high-school ‘Intro to Quantum Computing’ course
- secured IBM quantum sponsorship for the course and am developing further teaching materials

### MIT Admissions Volunteer

*Nov 2020 - Nov 2022*

MIT Office of Undergraduate Admissions

- review and rate portions of student applications for undergraduate admission

### MIT iQuISE Public Relations Manager

*July 2019 - May 2020*

MIT Interdisciplinary Quantum Information Science and Engineering program

- only undergrad board member of grad weekly seminars on quantum information, manage social media accounts and publicity

### MIT Undergraduate Research Journal (MURJ) Copy Editor & Features Staff

*Sept 2018 - Feb 2020*

Volume 36 Fall 2018 & Volume 37 Spring 2019

- Author of “Quantum Computing @ MIT” - conducted interviews with Prof. Isaac Chuang, Prof. Dirk Englund, Prof. Aram Harrow, Prof. William Oliver; article published in MURJ Fall 2019 publication

### MIT SWE Technology Chair

*Nov 2016 - Nov 2019*

MIT Society of Women Engineers

- organize workshops to teach SWE club members about tech topics (ie. Personal Websites, LaTeX, Quantum Computing, etc.)
- volunteer at STEM education events for local elementary and high-school girls

## **The Coding School Curriculum Developer, Teacher, & Advisory Board**

*June 2019 - May 2020*

The Coding School Non-Profit

- revamped Python curriculum, taught high-school girl for 2-weeks, and created LaTeX template to be used for entire curriculum
- member of the TCS Young Professionals Advisory Board
- lead development of a Quantum Computing curriculum, resulting in the Qubit by Qubit initiative

## **MIT Associate Academic Advisor**

*Sept. 2017 - May 2018*

Assistant to Prof. Dennis Freeman

- advised group of freshman on classes and navigating MIT, attended registration meetings with advisor

## **TPHS Math Tutoring**

*Nov 2012 - Jan 2015*

After-School Math Tutoring Center (Unpaid)

- tutored students in all grade levels in high school math courses including geometry, algebra, and calculus

## **OUTREACH TALKS**

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### **World Quantum Day 2024 – Invited Speaker**

*April 11th, 2024*

Qubit by Qubit Virtual Talk

- talk title: Into the Quantum World

### **SPIE Photonics West Conference 2023 – Invited Speaker**

*February 1st, 2023*

Quantum West: Quantum Workforce Development Panel

- talk title: What we've learned from training 20,000 students in QISE
- spoke on behalf of The Coding School non-profit CEO Kiera Peltz, presenting on K-12 quantum education work as Founding Academic Director and Lead Course Instructor for the Qubit x Qubit initiative, panel member

### **IEEE Quantum Engineering Conference (QEC) 2021 – Invited Speaker**

*October 21st, 2021*

Quantum Education Workshop

[Conference Program](#)

- talk title: Lessons learned from teaching a year-long global, virtual introduction to quantum computing course
- invited speaker, presenting on K-12 quantum education work as Founding Academic Director and Lead Course Instructor for the Qubit x Qubit initiative

### **Women in Quantum Summit IV – Invited Speaker**

*March 10th, 2021*

Fireside Chat

[Summit Program](#)

- talk title: The Quantum Road Not Taken
- talking about my personal path into and work in quantum computing, inspiring younger females in the field

### **QxQ Diversity in Quantum Computing Conference – Invited Panel Moderator**

*February 27th, 2021*

Educational Opportunities and Policy Landscape Roundtable

[Conference Website](#)

- moderated a panel on quantum education and policy with: Dr. Jessica Rosenberg (Associate Professor of Physics, George Mason University), Dr. Olivia Lanes (Quantum Researcher, IBM Quantum), Dr. Tomasz Durakiewicz (Program Director for Condensed Matter Physics, NSF), Dr. Kate Weber (Policy Lead for AI Research and Innovation, Google), and Dr. James Freericks (Professor of Physics, Georgetown University)

### **MIT Museum Girl's Day – Invited Speaker**

*November 15th, 2016*

"Secret Life of Robots"

- talk title: Limitless Possibility
- a 20 minute talk about my high school engineering and computer science projects to inspire young girls in greater-Boston

## STUDENTS MENTORED

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<b>Joaquin Arroyo</b>	San Diego high school student - QxQ student (2019-2020), helped with college applications
<b>Adrienne Chan</b>	Undergraduate student at UChicago - mentored through Scientella program
<b>Caroline Cavaliere</b>	Washington high school student - TCS student (2017), taught Python programming