JOAO BASSO

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EDUCATION

University of California, Berkeley, USA *August 2022 - present*
Ph.D. in Mathematics.

Tufts University, Medford, USA *September 2016 - May 2020*
Bachelor of Science, Summa Cum Laude, 3.91/4.0 GPA: Mathematics, Physics and Computer Science triple-major.
High Honors in Thesis: "Coordinate-free Tensor Analysis".
Activities: Tufts Symphony Orchestra (concertmaster), Tufts Chamber Orchestra (associate concertmaster), Tufts Youth Philharmonic (mentor).

PUBLICATIONS AND PRE-PRINTS

D. Berry, Y. Su, C. Gyurik, R. King, J. Basso, A. Barba, A. Rajput, N. Wiebe, V. Dunjko, R. Babbush (2022). Quantifying Advantage in Topological Data Analysis, *QIP 2022.*

Google Quantum AI and Collaborators (2022). Suppressing quantum errors by scaling a surface code logical qubit, *Nature.*

Google Quantum AI and Collaborators (2022). Formation of robust bound states of interacting photons, *Nature.*

Google Quantum AI and Collaborators (2022). Noise-resilient Majorana Edge Modes on a Chain of Superconducting Qubits, *Science.*

J. Basso, D. Gamarnik, S. Mei, L. Zhou (2022). Performance and limitations of the QAOA at constant levels on large sparse hypergraphs and spin glass models, *FOCS 2022.*

J. Basso, E. Farhi, K. Marwaha, B. Villalonga, L. Zhou (2021). The Quantum Approximate Optimization Algorithm at High Depth for MaxCut on Large-Girth Regular Graphs and the Sherrington-Kirkpatrick Model, *TQC 2022, Outstanding paper award.*

Google Quantum AI and Collaborators (2021). Time-Crystalline Eigenstate Order on a Quantum Processor, *Nature.*

Google Quantum AI and Collaborators (2021). Information scrambling in quantum circuits, *Science.*

Google Quantum AI and Collaborators (2021). Realizing topologically ordered states on a quantum processor, *Science.*

J. Basso, L. Tu (2020). Basis-free analysis of singular tuples and eigenpairs of tensors, *arXiv:2012.07313.*

M. Mosca, J. Basso, S. Verschoor (2020). On speeding up factoring with quantum SAT solvers, *Nature Scientific Reports.*

J. Basso, I. Yurchenko, M. Wiens, C. Staii (2019). Neuron dynamics on directional surfaces, *Soft Matter.*

I. Yurchenko, J. Basso, V. Syrotenko, C. Staii (2019). Anomalous diffusion for neuronal growth on surfaces with controlled geometries, *PLoS One.*

J. Basso, I. Yurchenko, M. Simon, D. Rizzo, C. Staii (2019). Role of geometrical cues in neuronal growth, *Physical Review E.*

J. Basso, M. Simon, C. Staii (2018). Neuronal dynamics on patterned substrates measured by fluorescence microscopy, *MRS Communications*.

WORK EXPERIENCE

Google Research - Quantum AI, Venice, CA, USA *August 2020 - August 2022*
AI Resident

Worked on the development and analysis of quantum algorithms.

Institute for Quantum Computing, Waterloo, ON, Canada *Summer 2020*
Research Assistant

· Worked with Prof. Michele Mosca on the quantum derandomization of algorithms and circuit synthesis.

Institute for Quantum Computing, Waterloo, ON, Canada *Summer 2019*
Research Assistant

· Worked with Prof. Michele Mosca on three projects: speeding up factoring with quantum SAT solvers, algorithms for lattices in the ℓ_p norm and algorithms for T-gate count.

Boston University, Boston, MA, USA *Summer 2018*
Research Assistant

· Worked on the 0,1-PERMANENT to #SAT reduction, tensor networks and relational algebra methods for solving SAT and other topics related to quantum computing, along with Prof. Claudio Chamon and Dr. Stefanos Kourtis.

Staii Research Group, Tufts University, Medford, MA, USA *2017 - 2020*
Research Assistant

· I worked with Prof. Staii investigating geometrical and topological properties of neuronal growth on controlled substrates.

Tufts University, Medford, MA, USA *2017 - 2020*
Teaching Assistant

· I have been a TA for: **Complex Variables** (Spring '19), **Algorithms** (Summer '18), **Linear Algebra** (Fall '19), **Discrete Mathematics** (Fall '17, Spring '18, Fall '18), **Intro to Physics 1** (Fall '17, Fall '18), **Intro to Physics 2** (Spring '18, Spring '19), **General Physics 11** (Fall '17, Fall '19), **General Physics 12** (Fall '17, Spring '20), **Portuguese** (Spring '17, Fall '17, Spring '18).
· Tasks involved teaching recitations, holding office hours, grading and proctoring.

Tufts CEEO, Medford, MA, USA *Winters 2017 & 2018*
Engineering Intern

· Development of a web-based IDE for programming the LEGO Mindstorms EV3 with Python. The IDE was later used by a professor for robotics classes at Tufts.

Escola Yadaa, Sao Carlos, SP, Brazil *January 2016 - August 2016*
Robotics and Programming Teacher

· Taught students 7+ and coached the teams that competed in the Brazilian Robotics Olympiad.

HONORS AND AWARDS

Outstanding Paper Prize: 17th Conference on the Theory of Quantum Computation, Communication and Cryptography. (TQC 2022)

2020 Senior Award: Awarded to six to 12 graduating members of the senior class for academic achievement, participation in campus and community activities, and leadership. (Tufts University Alumni Association, April 2020).

Benjamin G. Brown Scholarship: Awarded to Tufts seniors who have shown promise in scientific research. (Tufts University, April 2020)

Tufts Career Center Internship Grant: Received for a summer research internship at Boston University. (Summer 2018)

Howard Sample Prize Scholarship in Physics: Awarded for outstanding performance in General Physics I and II, calculus-based. (Tufts University, March 2018)

Portuguese Conversation Group Leader: Award of Excellence. (Tufts University, May 2017)

Brazilian Physics Olympiad: 1 Silver ('13), 1 Bronze ('12) and 1 Honorable Mention ('14) medals.

Physics Olympiad of Sao Paulo: 2 Bronze ('14, '10) medals.

Brazilian Astronomy and Astronautics Olympiad: 5 Gold ('08, '10, '12, '14, '15) and 3 Silver ('09, '11, '13) medals.

FIRST LEGO League: 1 Robot Design ('10) and 2 Core Values ('11, '13) trophies.

TALKS

"Performance and limitations of the QAOA at constant levels on different problems", American Physical Society March Meeting 2023, Las Vegas, NV, USA.

"Recent advances on the union-closed sets conjecture", Discrete Analysis Seminar, UC Berkeley, February 2023.

"Towards a quantum algorithm for the Unique Sink Orientation problem", Discrete Analysis Seminar, UC Berkeley, October 2022.

"Analytical guarantees and limitations of QAOA's performance", Quantum many-body seminar, UC Berkeley, September 2022.

"The QAOA at High Depth for MaxCut on Large-Girth Regular Graphs and the Sherrington-Kirkpatrick Model", American Physical Society March Meeting 2022, Chicago, IL, USA.

"Neuronal dynamics on patterned substrates measured by fluorescence microscopy", American Physical Society March Meeting 2019, Boston, MA, USA.

SERVICE

Paper refereeing: PRL; PRA; PRX Quantum; SODA 2023; TQC 2022; Nature Scientific Data; IEEE Transactions on Quantum Engineering; Quantum Journal; Quantum Science and Technology.

Session chair for "Understanding and Mitigating Decoherence in Superconducting Qubits" at APS March Meeting, 2023.

LANGUAGES

English (fluent); German (intermediate); Portuguese (native).