Maria Mucci

Contact Information

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Education

University of Pittsburgh, Pittsburgh, PA **August 2017 – Present**
Doctor of Philosophy - Physics

University of Pittsburgh, Pittsburgh, PA **2020**
Master of Science - Physics

Boston University, Boston, MA **2013 – 2017**
Bachelor of Arts with Honors - Physics
Honors Thesis: The Motion of *Helicobacter pylori* in Viscous Fluids

Research Experience

Doctoral Thesis **Expected August 2024**
Supervisor: Professor Michael Hatridge, University of Pittsburgh, Physics
- Bath engineering using superconducting quantum circuits
- Experimentally couple qubits, cavities, and non-linear couplers to drive parametric mixing processes to realize fully-controlled qubit temperatures and maser light sources
- See projects through all iterative steps: Hamiltonian design, microwave simulation, fabrication, hardware assembly, measurement
- Mentor and train graduate students in all lab processes

Senior Honors Undergraduate Thesis **2016-2017**
Supervisor: Professor Rama Bansil, Boston University, Physics
- Studied effects of viscous media on spiral-shaped *Helicobacter pylori* by examining rotational kinematics to determine how bacteria move through gastric mucin

Skills

- Cryogenics: Use, maintenance, and repair of dry dilution refrigerators for microwave systems
- Room temperature measurement: FPGA, VNA, spectrum analyzer
- Software experience: Python, Mathematica, Ansys HFSS and Maxwell, Microwave Office, SolidWorks 3D CAD, KLayout
- Nanofabrication: electron beam lithography, maskless aligners, evaporative and sputtering deposition systems, SEM imaging

Honors

- Best Poster Award, Pittsburgh Quantum Institute conference, 2024
- Thomas-Lain Fund Scholarship Essay Competition Winner, University of Pittsburgh, 2023
- Outstanding Poster Award, Pittsburgh Quantum Institute Fall Science conference, 2019
- Dietrich School of Arts and Sciences Summer Research Pre-Doctoral Fellowship, 2018
- Dietrich School of Arts and Sciences Graduate Fellowship, 2017-2018

Publications

- **Ultra-narrow masing with superconducting quantum circuits** M. Mucci, et al. *In prep.* (2024).
- **Engineering a quantum bath with non-linear parametric couplings** X. Cao and M. Mucci, G. Liu, D. Pekker, M. Hatridge. *In prep.* (2024).
- **Optimizing the geometric interference of a qubit to increase coherence** P. Patel, M. Xia, C. Zhou, P. Lu, X. Cao, I. Yusuf, M. Mucci, M. Hatridge. *In prep.* (2024).
- **Fast superconducting qubit control with sub-harmonic drives** M. Xia, C. Zhou, C. Liu, P. Patel, X. Cao, P. Lu, B. Mesits, M. Mucci, D. Gorski, D. Pekker, M. Hatridge. *arXiv: 2306.10162* (2023).
- **Proposal for a continuous wave laser with linewidth well below the standard quantum limit** C. Liu, M. Mucci, X. Cao, M.V.G. Dutt, M. Hatridge, D. Pekker. *Nature Comm.* **12** 5620 (2021).
  Featured as 'Physicists are Reinventing the Laser' on Gizmodo

Presentations

Invited Presentations

- QED-C student web panel, 2020

Contributed Oral Presentations

- Using three-wave mixing to achieve ultra-narrow masing with superconducting quantum circuits, APS March Meeting, 2024
- A Josephson junction-based maser using three-wave mixing, APS March Meeting, 2022
- Bath-engineering qubit systems with 3-wave mixing, APS March Meeting, 2021
- A Josephson maser via three-wave coupling, APS March Meeting, 2020

Poster Presentations

- Pittsburgh Quantum Institute conference, 2024
- Quantum Cavities conference, Jovence, Quebec, 2022
- Pittsburgh Quantum Institute conference, 2020
- Pittsburgh Quantum Institute Fall Science conference, 2019

Teaching

Teaching Assistant, University of Pittsburgh, 2019

- Taught recitations for introductory, calculus-based physics course. Created weekly quizzes and worksheets, hosted office hours and exam review sessions
- Graded for undergraduate quantum mechanics course

Learning Assistant, Boston University, 2014-2017
- Worked under graduate student TA in recitations. Hosted office hours and provided peer-to-peer assistance

Teacher, Destination Science summer camp, Stony Brook, NY, 2014-2017
- Implemented lessons and hands-on projects, teaching various science subjects to campers, grades K-6
- Engaged children in complicated topics using demonstrations and natural examples

Community Involvement

- Graduate Mentor, University of Pittsburgh, 2019-2021
- Undergraduate Mentor, Boston University, 2015-2017

Women and Minorities in Physics, University of Pittsburgh
President 2023-Present, Treasurer 2022-2023
- Organize events including self-defense classes, stress-management sessions, department-wide socials, and cultural diversity education days
- Interface with physics department and university student association offices to execute events and ensure funding and representation for club
- Aided club in receiving $1,000 APS Women in Physics Group Grant, 2023

Alpha Chi Sigma, Professional Co-Ed Chemical Fraternity, Boston University
President 2016-2017, Vice President 2015-2016, Fundraising Chair 2014-2015
- Led over 45 members to uphold fraternity objectives and professionalism in the sciences
- Organized weekly meetings and classes on fraternity history, oversaw all business and managed board members to guarantee completion of respective roles
- Planned and executed 2016 Northeastern District Conclave, hosting 80+ brothers and alumni to discuss science outreach, fraternity rituals, and opportunities for science graduates