Giavanna Jadick

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EDUCATION

Ph.D. Medical Physics, University of Chicago | *Chicago, IL*   2021 – present
- Thesis: "Spectral x-ray imaging and quantitative phase retrieval"
- Advisor: Patrick La Rivière, Ph.D.

B.S. Physics & B.A. Political Science, Duke University | *Durham, NC*   2016 – 2020
- Honors: Angier B. Duke Memorial Scholar, Cum Laude

Hillsborough High School | *Tampa, FL*   2012 – 2016
- International Baccalaureate Program, top exam score in graduating class

AWARDS & HONORS

Graduate Research Fellowship | *National Science Foundation*   2023 – 2026

$500 Dean's Council Travel Award | *Biological Sciences Division, University of Chicago*   2024

$500 Professional Development Grant | *Comprehensive Cancer Center, University of Chicago*   2024

$900 Students & Trainees Partial Scholarship | *Virtual Imaging Trials in Medicine Conference*   2024

$750 Student Travel Award | *SPIE Medical Imaging Conference*   2024

Carl J. Vyborny Award, Best Journal Club Talk | *Grad. Program in Medical Physics, University of Chicago*   2024

2nd place, Young Investigator Symposium | *American Assoc. of Physicists in Medicine, Midwest Chapter*   2023

$2,000 Small Grant | *Office of Diversity & Inclusion, Biological Sciences Division, University of Chicago*   2023

5th place, Truth-Based CT Reconstruction Challenge | *American Assoc. of Physicists in Medicine*   2022

$3,500 Summer Research Fellowship | *Physics Department, Duke University*   2020

Runner-Up Poster, Bass Connections Showcase | *Interdisciplinary Studies, Duke University*   2020

Angier B. Duke Memorial Scholarship | *Duke University*   2016 – 2020

Lord Rothermere Fellowship | *Oxford University*   2017

RESEARCH EXPERIENCE

Ph.D. Candidate | *Graduate Program in Medical Physics, University of Chicago*   2021 – present
- Advised by: Patrick La Rivière, Ph.D.
- Modeling spectral or multi-energy propagation-based phase-contrast x-ray imaging techniques to develop a quantitative solution to the phase retrieval problem.
- Quantified achievable image quality with "MV-kV" dual-energy CT using estimation theory in the context of basis material decomposition and simulation techniques.
- Implemented multi-material decomposition for dual-energy CT with cardiac imaging applications.
- Simulated CT acquisitions with energy-integrating and photon-counting detectors for comparison.
- Mentored summer student on project assessing dual-energy CT detectors for radiotherapy.

Research Technician II | *Ravin Advanced Imaging Labs, Duke University*   2020 – 2021
- Advised by: Ehsan Samei, Ph.D. & Ehsan Abadi, Ph.D.

- Helped develop realistic CT simulator (DukeSim), implementing features including beam hardening correction, tube current modulation, spherical detector geometry, photon counting noise model.
- Created DukeSim Python wrapper for rapid simulation studies.
- Developed and taught DukeSim trainings for other lab members.

"Saxophone Mouthpiece Design" Research Team | *Interdisciplinary Studies, Duke University*   2019 – 2020
- Advised by: Joshua Socolar, Ph.D. & Matthew Busch
- Created 3D archive of vintage sax mouthpieces using micro-CT scans.
- Extracted audio metrics from Fourier spectra of recordings with original vintage mouthpieces and 3D-printed copies.
- Analyzed micro-CT measurements in relation to extracted audio metrics in Python.

Undergraduate Research Assistant | *Physics Department, Duke University*   2019 – 2020
- Advised by: Christoph Schmidt, Ph.D.
- Assessed membrane response of *E. coli* under different osmotic conditions.
- Quantified elastic bending energy of bacterial membranes by writing image analysis scripts and running *Surface Evolver* simulations.

Clinical Research Intern | *Digestive Health Institute, Florida Hospital Tampa*   2015 – 2016
- Advised by: Alexander Rosemurgy, M.D. & Sharona Ross, M.D.
- Shadowed physicians in the clinic, on rounds, and in the operating room.
- Conducted rigorous statistical analysis and chart review of patients with esophageal disorders.
- Assessed post-op. satisfaction of achalasia patients with respect to age and other comorbidities.

PUBLICATIONS

Peer-reviewed manuscripts

1. Hadley DeBrosse, Giavanna Jadick, Ling Jian Meng, and Patrick La Rivière. Contrast-to-noise ratio comparison between x-ray fluorescence emission tomography and computed tomography. *Journal of Medical Imaging*, 2024
2. Giavanna Jadick, Geneva Schlafly, and Patrick J La Rivière. Dual-energy computed tomography imaging with megavoltage and kilovoltage x-ray spectra. *Journal of Medical Imaging*, 11(2):023501–023501, 2024. ***Featured on journal cover**
3. Ehsan Abadi, Giavanna Jadick, David A Lynch, W Paul Segars, and Ehsan Samei. Emphysema quantifications with CT scan: Assessing the effects of acquisition protocols and imaging parameters using virtual imaging trials. *Chest*, 163(5):1084–1100, 2023
4. Giavanna Jadick, Ehsan Abadi, Brian Harrawood, Shobhit Sharma, W Paul Segars, and Ehsan Samei. A scanner-specific framework for simulating CT images with tube current modulation. *Physics in Medicine & Biology*, 66(18):185010, 2021
5. Darrell J Downs, Giavanna Jadick, Forat Swaid, Sharona B Ross, and Alexander S Rosemurgy. Age and achalasia: how does age affect patient presentation, hospital course, and surgical outcomes? *The American Surgeon*, 83(9):952–961, 2017
6. Alexander Rosemurgy, Darrell Downs, Giavanna Jadick, Forat Swaid, Kenneth Luberice, Carrie Ryan, and Sharona Ross. Dissatisfaction after laparoscopic Heller myotomy: The truth is easy to swallow. *The American Journal of Surgery*, 2017

Conference proceedings, posters, and oral presentations

1. Giavanna Jadick and Patrick La Rivière. Accuracy of propagation-based phase-contrast CT under the projection approximation. In *8th International Conference on Image Formation in X-Ray Computed Tomography*, 2024
2. Giavanna Jadick. An estimation theory approach to assessing spectral x-ray phase-contrast imaging. In *Gordon Research Conference on Image Science*, 2024
3. Giavanna Jadick and Patrick La Rivière. Modeling propagation-based x-ray phase-contrast imaging: validity of the projection approximation. In *Proc. Virtual Imaging Trials in Medicine*, pages 68–72, 2024
4. Giavanna Jadick and Patrick La Rivière. Cramér–Rao lower bound in the context of spectral x-ray imaging with propagation-based phase contrast. In *Medical Imaging 2024: Physics of Medical Imaging*, volume 12925. SPIE, 2024

5. Giavanna Jadick, Ingrid Reiser, and Patrick La Rivière. Sensitivity analysis of dual-energy computed tomography multi-triplet material decomposition. In *Medical Imaging 2024: Physics of Medical Imaging*, volume 12925. SPIE, 2024

6. Hadley DeBrosse, Giavanna Jadick, LJ Meng, and Patrick La Rivière. Comparing x-ray fluorescence emission tomography and computed tomography: contrast-to-noise ratios in a numerical mouse phantom. In *Medical Imaging 2024: Clinical and Biomedical Imaging*, volume 12930. SPIE, 2024

7. Maya Ventura, Giavanna Jadick, and Patrick La Rivière. Comparison of energy-integrating detectors and photon-counting detectors for MV-kV dual-energy imaging on a tomographic therapy system. In *Medical Imaging 2024: Physics of Medical Imaging*, volume 12925. SPIE, 2024

8. Giavanna Jadick and Patrick La Rivière. Dual energy CT imaging with a megavoltage spectrum. American Association of Physicists in Medicine, Midwest Chapter Meeting, April 2023. ***2nd place, Young Investigator Symposium**

9. Giavanna Jadick and Patrick La Rivière. Optimization of MV-kV dual-energy CT imaging for tomographic therapy. In *Medical Imaging 2023: Physics of Medical Imaging*, volume 12463, pages 557–566. SPIE, 2023

10. Sachin S Shankar, Giavanna L Jadick, Eric A Hoffman, Jarron Atha, Jessica C Sieren, Ehsan Samei, and Ehsan Abadi. Scanner-specific validation of a CT simulator using a COPD-emulated anthropomorphic phantom. In *Medical Imaging 2022: Physics of Medical Imaging*, volume 12031, pages 953–960. SPIE, 2022

11. Francesco Ria, Giavanna L Jadick, Ehsan Abadi, Justin B Solomon, and Ehsan Samei. Comparing two different noise magnitude estimation methods in CT using virtual imaging trials. In *Medical Imaging 2022: Physics of Medical Imaging*, volume 12031, pages 729–734. SPIE, 2022

12. E Abadi, G Jadick, C McCabe, S Sotoudeh, M Fryling, B Harrawood, E Samei, S Havadej, M Sedlmair, JC Ramirez, and K Stierstorfer. Development and application of a virtual imaging trial platform to evaluate and optimize state-of-the-art photon-counting CT. Radiological Society of North America Annual Meeting, 2021

13. Giavanna Jadick, Ehsan Abadi, Brian Harrawood, Shobhit Sharma, W Paul Segars, and Ehsan Samei. A framework to simulate CT images with tube current modulation. In *Medical Imaging 2021: Physics of Medical Imaging*, volume 11595, pages 22–30. SPIE, 2021

14. Ehsan Abadi, Giavanna Jadick, Eric A Hoffman, David Lynch, W Paul Segars, and Ehsan Samei. COPD quantifications via CT imaging: ascertaining the effects of acquisition protocol using virtual imaging trial. In *Medical Imaging 2021: Physics of Medical Imaging*, volume 11595, pages 160–166. SPIE, 2021

15. Giavanna Jadick, Max Bartlett, Matthew Busch, and Joshua Socolar. The art and craft of saxophone mouthpiece design. Fortin Foundation Bass Connections Virtual Showcase, May 2020. ***runner-up poster award**

16. Giavanna Jadick, Renata Garces, and Christoph Schmidt. Physiology of E. Coli bacteria in high external osmotic pressure. Conference for undergraduate women in physics at the University of Maryland, January 2020

17. Giavanna Jadick. Gender representation in science policy: A study of Capitol Hill. Sigma Pi Sigma Physics Congress in Providence, RI, November 2019

Teaching Experience

qBio Bootcamp Teaching Assistant | *Biological Sciences Division, University of Chicago*   2023
- TA for the Quantitative Biology "qBio" bootcamp to teach coding principles to incoming biological sciences Ph.D. students using R.
- Head TA for the image analysis workshop with Jasmine Nirody, Ph.D.

"Introduction to Coding in Science" Instructor | *Chicago EYES on Cancer, University of Chicago*   2023
- Designed a four-part coding bootcamp for high school and undergraduate summer research students to teach fundamentals of coding.
- Taught basic principles (syntax, logic gates, etc.) and applications in data analysis and imaging.

Medical Physics Teaching Assistant | *Graduate Program in Medical Physics, University of Chicago*   2022 – 2023
- Graduate TA for "Mathematics for Medical Physics" (Autumn 2022) and "Physics of Medical Imaging 1" (Winter 2023).
- Led discussion sessions with short lectures, group problem solving, and interactive Jupyter Notebooks to demonstrate concepts such as the 2D Fourier Transform and Radon Transform.
- Graded and provided detailed feedback on homework assignments, lab reports, and final exams.

Physics Teaching Assistant | *Department of Physics, Duke University*   2017 – 2020
- Independently led labs and helped grading for introductory mechanics and E&M courses.

- Assisted in rapid transition of E&M labs to a virtual format for summer 2020.

Physics Community Outreach Volunteer | *Physics Department, Duke University* 2017 – 2020
- Performed basic physics demonstrations for gradeschool students at science fairs and field trips.

House Course Student Instructor | *Trinity College of Arts & Sciences, Duke University* 2019 – 2020
- Designed and taught two undergraduate courses after competitive proposal process.
- "Physics for Everyone" on equity in STEM and best learning techniques.
- "Physics in Cinema" exploring laws of physics through movie analysis.

Math Teaching Assistant | *Department of Mathematics, Duke University* 2020
- Assisted students in the introductory calculus help room.

Computer Science Teaching Assistant | *Department of Computer Science, Duke University* 2017
- Co-led weekly labs and graded exams for introductory computer science.

Leadership Experience

Chapter President | *SPIE, University of Chicago Student Chapter* 2024 – present

Director of Outreach | *Diversity & Outreach Committee, Medical Physics, University of Chicago* 2022 – present
- Led the medical physics graduate program's involvement in annual on-campus science fairs.
- Secured grant funding to design and build new CT, MRI, and radiation therapy demos.
- Organized students and faculty in drafting the program's 2022 Diversity Statement.
- Worked with Chicago Public Schools and UChicago Comprehensive Cancer Center to host professional learning days for physics teachers with research talks, outreach demos, and lab tours.
- Worked with UChicago Comprehensive Cancer Care Center to purchase a portable ultrasound for off-campus outreach presentations.
- Organized and delivered presentations at Lindblom Math & Science Academy and Tilden High.

President | *Graduate Program in Medical Physics, University of Chicago* 2022 – 2023
- Elected to serve as the primary liaison between medical physics students and faculty.
- Joined faculty meetings and organized regular meetings with the program director and students.
- Facilitated student initiatives: bi-weekly journal club, peer-mentor program, and office lunches.
- Led planning and coordination of the bi-annual retreat.

President | *Society of Physics Students, Duke University* 2018 – 2020
- Reestablished the chapter, directed executive meetings, authored constitution and by-laws, secured funding, and designed website.
- Launched several projects including crash courses in Mathematica and MATLAB, career advising sessions, and community outreach.
- Won multiple National SPS awards (2019 Distinguished Chapter, 2020 Outstanding Chapter).

Other Experience

Peer reviewer | *Journal of Medical Imaging* 2023 – present

American Institute of Physics Mather Public Policy Intern | *U.S. House of Representatives* 2019
- Rotated through subcommittees in the House Committee on Science, Space & Technology.
- Researched upcoming hearing topics (deep sea exploration, renewable energy, artificial intelligence, etc.) and prepared briefs for members of Congress.
- Met with invited scientists, discussed their work, and observed their remarks in hearings.
- Collected demographic data of Capitol Hill briefings and analyzed results using text and regression analyses in Python, presented at the Society of Physics Students internship closing symposium.

Climate Policy Intern | *Niskanen Center, Washington, DC* 2018
- Assessed and presented the merits of competing climate modeling techniques with thorough literature review.
- Designed interactive Bayesian belief networks in Python as tools for politicians to better understand climate science.

Professional Affiliations

University of Chicago Medicine Comprehensive Cancer Center | *Trainee Associate Member*   2024 – present

SPIE, International Society for Optics and Photonics | *Student Member*   2021 – present

American Association of Physicists in Medicine | *Student Member*   2021 – present

Pi Sigma Alpha, Political Science Honor Society | *Member*   2020 – present

Sigma Pi Sigma, Physics Honor Society | *Member*   2019 – present

Skills

Computational: Bash, C/C++, CUDA, ImageJ, Git, LaTeX, Linux/Unix, Python, MATLAB, Mathematica, R

Libraries: CuPy, pandas, numba, NumPy, Matplotlib, PyCuda, SciPy

Experimental: CT, microscopy (DIC, confocal, AFM), micro-CT, electronics, misc. wet lab

Interests: Jazz saxophone, flamenco guitar, Spanish and Italian language, geography, political philosophy

[CV compiled on September 16, 2024]