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

Lawrence H. Lanzl Medical Physics Graduate Fellowship | *University of Chicago* 2024

$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 three students: (1) a summer student on dual-energy CT detectors for radiotherapy, (2) a graduate rotation student on multi-distance phase retrieval, and (3) an undergraduate on accurate phase-contrast imaging forward modeling.

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 articles

1. E. Abadi, W. P. Segars, N. Felice, S. Sotoudeh-Paima, E. A. Hoffman, X. Wang, W. Wang, D. Clark, S. Ye, **G. Jadick**, M. Fryling, D. P. Frush, and E. Samei, "AAPM Truth-based CT (TrueCT) reconstruction grand challenge," *Medical Physics*, pp. 1–13, 2025
2. **G. Jadick**, M. Ventura, and P. J. La Rivière, "Utility of photon-counting detectors for MV-kV dual-energy computed tomography imaging," *Journal of Medical Imaging*, vol. 11, no. S1, pp. S12 811–S12 811, 2024
3. H. DeBrosse, **G. Jadick**, L. J. Meng, and P. La Rivière, "Contrast-to-noise ratio comparison between x-ray fluorescence emission tomography and computed tomography," *Journal of Medical Imaging*, 2024
4. **G. Jadick**, G. Schlafly, and P. J. La Rivière, "Dual-energy computed tomography imaging with megavoltage and kilovoltage x-ray spectra," *Journal of Medical Imaging*, vol. 11, no. 2, pp. 023 501–023 501, 2024, ***Featured on journal cover**
5. E. Abadi, **G. Jadick**, D. A. Lynch, W. P. Segars, and E. Samei, "Emphysema quantifications with CT scan: Assessing the effects of acquisition protocols and imaging parameters using virtual imaging trials," *Chest*, vol. 163, no. 5, pp. 1084–1100, 2023
6. **G. Jadick**, E. Abadi, B. Harrawood, S. Sharma, W. P. Segars, and E. Samei, "A scanner-specific framework for simulating CT images with tube current modulation," *Physics in Medicine & Biology*, vol. 66, no. 18, p. 185010, 2021
7. D. J. Downs, **G. Jadick**, F. Swaid, S. B. Ross, and A. S. Rosemurgy, "Age and achalasia: how does age affect patient presentation, hospital course, and surgical outcomes?" *The American Surgeon*, vol. 83, no. 9, pp. 952–961, 2017
8. A. Rosemurgy, D. Downs, **G. Jadick**, F. Swaid, K. Luberice, C. Ryan, and S. Ross, "Dissatisfaction after laparoscopic Heller myotomy: The truth is easy to swallow," *The American Journal of Surgery*, 2017

Conference proceedings

1. **G. Jadick** and P. 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. **G. Jadick** and P. La Rivière, "Modeling propagation-based x-ray phase-contrast imaging: validity of the projection approximation," in *Proc. Virtual Imaging Trials in Medicine*, 2024, pp. 68–72

3. **G. Jadick** and P. 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*, vol. 12925. SPIE, 2024
4. **G. Jadick**, I. Reiser, and P. La Rivière, "Sensitivity analysis of dual-energy computed tomography multi-triplet material decomposition," in *Medical Imaging 2024: Physics of Medical Imaging*, vol. 12925. SPIE, 2024
5. H. DeBrosse, **G. Jadick**, L. Meng, and P. 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*, vol. 12930. SPIE, 2024
6. M. Ventura, **G. Jadick**, and P. 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*, vol. 12925. SPIE, 2024
7. **G. Jadick** and P. La Rivière, "Optimization of MV-kV dual-energy CT imaging for tomographic therapy," in *Medical Imaging 2023: Physics of Medical Imaging*, vol. 12463. SPIE, 2023, pp. 557–566
8. S. S. Shankar, **G. Jadick**, E. A. Hoffman, J. Atha, J. C. Sieren, E. Samei, and E. Abadi, "Scanner-specific validation of a CT simulator using a COPD-emulated anthropomorphic phantom," in *Medical Imaging 2022: Physics of Medical Imaging*, vol. 12031. SPIE, 2022, pp. 953–960
9. F. Ria, **G. Jadick**, E. Abadi, J. B. Solomon, and E. Samei, "Comparing two different noise magnitude estimation methods in CT using virtual imaging trials," in *Medical Imaging 2022: Physics of Medical Imaging*, vol. 12031. SPIE, 2022, pp. 729–734
10. E. Abadi, **G Jadick**, C. McCabe, S. Sotoudeh, M. Fryling, B. Harrawood, E. Samei, S. Havadej, M. Sedlmair, J. 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
11. **G. Jadick**, E. Abadi, B. Harrawood, S. Sharma, W. P. Segars, and E. Samei, "A framework to simulate CT images with tube current modulation," in *Medical Imaging 2021: Physics of Medical Imaging*, vol. 11595. SPIE, 2021, pp. 22–30
12. E. Abadi, **G. Jadick**, E. A. Hoffman, D. Lynch, W. P. Segars, and E. Samei, "COPD quantifications via CT imaging: ascertaining the effects of acquisition protocol using virtual imaging trial," in *Medical Imaging 2021: Physics of Medical Imaging*, vol. 11595. SPIE, 2021, pp. 160–166

Oral presentations

1. **G. Jadick** and P. La Rivière, "Modeling propagation-based x-ray phase-contrast imaging: validity of the projection approximation," in *Proc. Virtual Imaging Trials in Medicine*, 2024, pp. 68–72
2. **G. Jadick** and P. 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*, vol. 12925. SPIE, 2024
3. **G. Jadick** and P. L. 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**
4. **G. Jadick**, E. Abadi, B. Harrawood, S. Sharma, W. P. Segars, and E. Samei, "A framework to simulate CT images with tube current modulation," in *Medical Imaging 2021: Physics of Medical Imaging*, vol. 11595. SPIE, 2021, pp. 22–30

Posters

1. **G. Jadick** and P. 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. **G. Jadick** and P. La Rivière, "An estimation theory approach to assessing spectral x-ray phase-contrast imaging," in *Gordon Research Conference on Image Science*, 2024
3. **G. Jadick**, I. Reiser, and P. La Rivière, "Sensitivity analysis of dual-energy computed tomography multi-triplet material decomposition," in *Medical Imaging 2024: Physics of Medical Imaging*, vol. 12925. SPIE, 2024
4. **G. Jadick** and P. La Rivière, "Optimization of MV-kV dual-energy CT imaging for tomographic therapy," in *Medical Imaging 2023: Physics of Medical Imaging*, vol. 12463. SPIE, 2023, pp. 557–566
5. **G. Jadick**, M. Bartlett, M. Busch, and J. Socolar, "The art and craft of saxophone mouthpiece design," Fortin Foundation Bass Connections Virtual Showcase, May 2020, ***runner-up poster award**
6. **G. Jadick**, R. Garces, and C. Schmidt, "Physiology of E. Coli bacteria in high external osmotic pressure," Conference for undergraduate women in physics at the University of Maryland, January 2020
7. **G. 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.

Chapter 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 to more intuitively interpret climate science research.

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: chromatix, CuPy, jax, pandas, numba, NumPy, Matplotlib, PyCuda, SciPy

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

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

[CV compiled on February 6, 2025]