

# Giavanna Jadick

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## EDUCATION

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- Ph.D. Medical Physics, University of Chicago** | *Chicago, IL* 2021 – June 2026 (expected)
- Thesis: “Spectral X-ray imaging and quantitative phase retrieval”
  - Advisor: Patrick La Rivière, Ph.D.
  - Funding: NSF Graduate Research Fellowship Program, AAPM/RSNA Graduate Fellowship
- B.S. Physics & B.A. Political Science, Duke University** | *Durham, NC* 2016 – 2020
- Honors: Angier B. Duke Memorial Scholar, Cum Laude

## RESEARCH

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- Ph.D. Candidate** | *Graduate Program in Medical Physics, University of Chicago* 2021 – present
- Advised by: Patrick La Rivière, Ph.D.
  - Developed the first automatic-differentiation-based phase retrieval framework for 2D and 3D multi-energy propagation-based X-ray phase-contrast imaging (PB-XPCI), enabling quantitative material decomposition
  - Derived the Cramér–Rao lower bound for PB-XPCI and used to assess/optimize phase retrieval approaches
  - Built CT simulation and estimation-theory pipeline, demonstrating the unique utility of dual-energy CT with megavoltage spectra for radiotherapy imaging
  - Investigated multi-material decomposition strategies for dual-energy CT in context of cardiac imaging
  - Collaborated on comparative evaluation of X-ray fluorescence emission tomography versus conventional micro-CT to demonstrate proof-of-benefit
- Research Technician II** | *Ravin Advanced Imaging Labs, Duke University* 2020 – 2021
- Advised by: Ehsan Samei, Ph.D. & Ehsan Abadi, Ph.D.
  - Co-developed DukeSim CT simulation platform; implemented beam-hardening correction, tube current modulation, spherical detector geometry, and photon-counting detector noise model
  - Created a Python wrapper to accelerate workflow of large-scale virtual imaging trials
  - Designed and delivered multi-modal DukeSim training sessions for incoming lab members
- “Saxophone Mouthpiece Design” Research Team** | *Bass Connections, Duke University* 2019 – 2020
- Advised by: Joshua Socolar, Ph.D. & Matthew Busch
  - Built digital archive of vintage saxophone mouthpieces using micro-CT scanning
  - Extracted acoustic metrics from Fourier spectra of recordings with original and 3D-printed mouthpieces
  - Linked micro-CT geometric measurements with acoustic properties through custom Python analysis
  - Project featured in articles from [Duke Today](#) and [3dprint.com](#)
- Undergraduate Research Assistant** | *Physics Department, Duke University* 2019 – 2020
- Advised by: Christoph Schmidt, Ph.D.
  - Studied *E. coli* membrane response under osmotic stress using microscopy and image analysis
  - Created Python scripts and Surface Evolver simulations to quantify inner membrane elastic bending energy
- Clinical Research Intern** | *Digestive Health Institute, Florida Hospital Tampa* 2015 – 2016
- Advised by: Alexander Rosemurgy, M.D. & Sharona Ross, M.D.
  - Performed chart review and statistical analyses of surgical outcomes in patients with esophageal disorders
  - Contributed to studies assessing patient satisfaction and long-term outcomes in achalasia treatment
  - Piloted investigation of the relationship between age, achalasia severity, and patient outcomes

## TEACHING

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### ◇ Independent Course Design & Teaching

**Research Skills for Medical Physics (Instructor/Coordinator)** | *Medical Physics, UChicago* 2025 – present

- Launched and coordinated new graduate professional skills mini-course after identifying gaps between incoming Ph.D. student preparation and curriculum expectation
- Designed and taught a one-day “Coding for Medical Physics” bootcamp to orient new students
- Organized bi-weekly seminar series inviting senior students, staff, and faculty to teach practical skills

**Coding in Science (Invited Lecturer)** | *Cancer Center, UChicago Medicine* 2023

- Led two 3-hour lessons on coding for ~40 high school and undergraduate summer research students
- Introduced coding fundamentals and scientific applications with original [Jupyter notebook lessons](#)

**House Course: Exploring Physics in Cinema (Instructor)** | *Duke University* 2020

- Designed and taught an interdisciplinary course introducing physics concepts through film analysis

**House Course: Physics for Everyone (Instructor)** | *Duke University* 2019

- Designed and taught a seminar on equity in STEM and best practices for learning physics

### ◇ Teaching Assistantships

**Graduate Teaching Assistant** | *Medical Physics, UChicago* 2022 – 2025

- Led weekly 1-hour discussion sessions (~5 students) with original lectures and group problem sets, which continue to be used by current course TAs
- Created [interactive Jupyter notebooks](#) demonstrating abstract physics/math concepts
- Graded and provided detailed feedback on homework, labs, and final exams
- Courses: MPHY 388 “Physics of Medical Imaging III” (Summer 2025), MPHY 386 “Physics of Medical Imaging I” (Winter 2023), MPHY 349 “Mathematics for Medical Physics” (Fall 2022)

**Quantitative Biology “qBio” Bootcamp TA** | *Biological Sciences Division, UChicago* 2023

- Taught intensive one-week coding/data analysis course for ~100 incoming biology Ph.D. students
- Served as head TA for image analysis workshop on cell tracking: co-developed workshop material, delivered part of the lecture, and guided students through debugging

**Undergraduate Teaching Assistant** | *Duke University* 2017 – 2020

- PHY 141/142/151/152: Led weekly labs (~30 students) on introductory mechanics and E&M, staffed help room and office hours, and graded exams and lab reports
- PHY 151/152: Selected by instructor and dean to lead weekly remedial sessions for at-risk students; independently developed lectures and tailored problem sets, resulting in all ~10 participants passing
- CS 101: Co-led weekly introductory computer science labs (~30 students) and graded final exams
- MATH 105/106/111/112: Ran help room for introductory calculus

## AWARDS & HONORS

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**AAPM/RSNA Graduate Fellowship** | *American Association of Physicists in Medicine (AAPM)* 2025 – 2026

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

**Blue Ribbon Poster Award** | *AAPM Annual Meeting* 2025

**Travel Award** | *Fully 3D Image Reconstruction Meeting* 2025

**Second Place Oral Presentation** | *Young Investigator Symposium, AAPM Midwest Chapter Meeting* 2025

**Best Poster Award** | *Trainee Associate Member Symposium, Cancer Center, UChicago* 2025

**Lawrence H. Lanzl Medical Physics Graduate Fellowship** | *UChicago* 2024

- Voted by faculty as best dissertation proposal presentation

**Dean’s Council Travel Award** | *Biological Sciences Division, UChicago* 2024

<b>Professional Development Grant</b>   <i>Cancer Center, UChicago</i>	2024
<b>Students &amp; Trainees Partial Scholarship</b>   <i>Virtual Imaging Trials in Medicine Conference</i>	2024
<b>Student Travel Award</b>   <i>SPIE Medical Imaging Conference</i>	2024
<b>Carl J. Vyborny Award</b>   <i>Graduate Program in Medical Physics, UChicago</i>	2024
• Voted by students as best journal club talk	
<b>Second Place Oral Presentation</b>   <i>Young Investigator Symposium, AAPM Midwest Chapter Meeting</i>	2023
<b>Small Grant (\$2,000)</b>   <i>Office of Diversity &amp; Inclusion, Biological Sciences Division, UChicago</i>	2023
<b>Truth-Based CT Reconstruction Challenge, Top Five</b>   <i>AAPM</i>	2022
• Ranked among most accurate reconstruction algorithms; invited to co-author challenge report	
<b>Summer Research Fellowship</b>   <i>Physics Department, Duke University</i>	2020
<b>Runner-Up Poster, Bass Connections Showcase</b>   <i>Interdisciplinary Studies, Duke University</i>	2020
<b>Angier B. Duke Memorial Scholarship</b>   <i>Duke University</i>	2016 – 2020
• Duke's flagship full-ride merit scholarship awarded annually to ~10 incoming students	
<b>Lord Rothermere Fellowship</b>   <i>Oxford University</i>	2017
• Full funding for summer studying political philosophy with Duke University cohort	

## PUBLICATIONS & PRESENTATIONS

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### 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*, pages 1–13, 2025. [doi:10.1002/mp.17619](https://doi.org/10.1002/mp.17619)
2. **G. Jadick**, M. Ventura, and P. La Rivière. Utility of photon-counting detectors for MV-kV dual-energy computed tomography imaging. *Journal of Medical Imaging*, 11(S1):S12811–S12811, 2024. [doi:10.1117/1.JMI.11.S1.S12811](https://doi.org/10.1117/1.JMI.11.S1.S12811)
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*, 11(S1):S12808–S12808, 2024. [doi:10.1117/1.JMI.11.S1.S12808](https://doi.org/10.1117/1.JMI.11.S1.S12808)
4. **G. Jadick**, G. Schlafly, and P. 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.** [doi:10.1117/1.JMI.11.2.023501](https://doi.org/10.1117/1.JMI.11.2.023501)
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*, 163(5):1084–1100, 2023. [doi:10.1016/j.chest.2022.11.033](https://doi.org/10.1016/j.chest.2022.11.033)
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*, 66(18):185010, 2021. [doi:10.1088/1361-6560/ac2269](https://doi.org/10.1088/1361-6560/ac2269)
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*, 83(9):952–961, 2017. [doi:10.1177/000313481708300931](https://doi.org/10.1177/000313481708300931)
8. A. Rosemurgy, D. Downs, **G. Jadick**, F. Swaid, K. Luberic, C. Ryan, and S. Ross. Dissatisfaction after laparoscopic Heller myotomy: The truth is easy to swallow. *The American Journal of Surgery*, 2017. [doi:10.1016/j.amjsurg.2017.03.043](https://doi.org/10.1016/j.amjsurg.2017.03.043)

### Conference proceedings

1. **G. Jadick** and P. La Rivière. Optimization-based phase retrieval for material decomposition with multi-energy computed tomography. In *18th International Meeting on Fully 3D Image Reconstruction in Radiology and Nuclear Medicine*, May 2025. [doi:10.48550/arXiv.2508.12509](https://doi.org/10.48550/arXiv.2508.12509)
2. **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. [doi:10.48550/arXiv.2508.12505](https://doi.org/10.48550/arXiv.2508.12505)

3. **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*, pages 68–72, 2024. [doi:10.48550/arXiv.2405.05359](https://doi.org/10.48550/arXiv.2405.05359)
4. **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*, volume 12925. SPIE, 2024. [doi:10.1117/12.3006282](https://doi.org/10.1117/12.3006282)
5. **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*, volume 12925. SPIE, 2024. [doi:10.1117/12.3006548](https://doi.org/10.1117/12.3006548)
6. 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*, volume 12930. SPIE, 2024. [doi:10.1117/12.3006795](https://doi.org/10.1117/12.3006795)
7. 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*, volume 12925. SPIE, 2024. [doi:10.1117/12.3006854](https://doi.org/10.1117/12.3006854)
8. **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*, volume 12463, pages 557–566. SPIE, 2023. [doi:10.1117/12.2653674](https://doi.org/10.1117/12.2653674)
9. 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*, volume 12031, pages 953–960. SPIE, 2022. [doi:10.1117/12.2613212](https://doi.org/10.1117/12.2613212)
10. 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*, volume 12031, pages 729–734. SPIE, 2022. [doi:10.1117/12.2612219](https://doi.org/10.1117/12.2612219)
11. 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. In *Radiological Society of North America Annual Meeting*, 2021
12. **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*, volume 11595, pages 22–30. SPIE, 2021. [doi:10.1117/12.2580983](https://doi.org/10.1117/12.2580983)
13. 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*, volume 11595, pages 160–166. SPIE, 2021. [doi:10.1117/12.2581965](https://doi.org/10.1117/12.2581965)

## Oral presentations

1. **G. Jadick** and P. La Rivière. Material decomposition of weakly absorptive structures with spectral x-ray phase-contrast CT. In *IEEE Medical Imaging Conference*, November 2025. \*will present in November
2. **G. Jadick** and P. La Rivière. A tale of two techniques: multi-energy versus multi-distance material decomposition with x-ray phase-contrast imaging. American Association of Physicists in Medicine, Midwest Chapter Meeting, April 2025. **\*Second Place, Young Investigator Symposium**
3. **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*, pages 68–72, 2024. [doi:10.48550/arXiv.2405.05359](https://doi.org/10.48550/arXiv.2405.05359)
4. **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*, volume 12925. SPIE, 2024. [doi:10.1117/12.3006282](https://doi.org/10.1117/12.3006282)
5. **G. Jadick** and P. La Rivière. Dual energy CT imaging with a megavoltage spectrum. American Association of Physicists in Medicine, Midwest Chapter Meeting, April 2023. **\*Second Place, Young Investigator Symposium**
6. **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*, volume 11595, pages 22–30. SPIE, 2021. [doi:10.1117/12.2580983](https://doi.org/10.1117/12.2580983)

## Posters

1. **G. Jadick**, C. Riggs, and P. La Rivière. Quantitative forward modeling of propagation-based x-ray phase-contrast imaging at clinical scale. In *American Association of Physicists in Medicine, Annual Meeting*, July 2025. **\*Blue Ribbon Poster**. URL: <https://aapm.confex.com/aapm/2025am/meetingapp.cgi/Paper/17710>
2. **G. Jadick** and P. La Rivière. Material decomposition with propagation-based x-ray phase contrast: a comparison of multi-energy and multi-distance imaging. In *American Association of Physicists in Medicine, Annual Meeting*, July 2025. URL: <https://aapm.confex.com/aapm/2025am/meetingapp.cgi/Paper/18361>
3. **G. Jadick** and P. La Rivière. Optimization-based phase retrieval for material decomposition with multi-energy computed tomography. In *18th International Meeting on Fully 3D Image Reconstruction in Radiology and Nuclear Medicine*, May 2025. doi:10.48550/arXiv.2508.12509
4. **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. doi:10.48550/arXiv.2508.12505
5. **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*, June 2024
6. **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*, volume 12925. SPIE, 2024. doi:10.1117/12.3006548
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*, volume 12463, pages 557–566. SPIE, 2023. doi:10.1117/12.2653674
8. **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**
9. **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
10. **G. Jadick**. Gender representation in science policy: A study of Capitol Hill. Sigma Pi Sigma Physics Congress in Providence, RI, November 2019

## LEADERSHIP & SERVICE

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<b>Dean's Council Representative</b>   <i>Biological Sciences Division (BSD), University of Chicago</i>	2025 – present
<ul style="list-style-type: none"> <li>• Represent Medical Physics in monthly BSD meetings and convey program needs to administration</li> <li>• Advocate for funding, resources, and community-building events to support graduate students</li> </ul>	
<b>Peer Reviewer</b>   <i>Medical Physics; Journal of Medical Imaging</i>	2023 – present
<b>President</b>   <i>SPIE, UChicago Student Chapter</i>	2024 – 2025
<ul style="list-style-type: none"> <li>• Secured maximum annual funding from SPIE national to support student chapter activities</li> <li>• Organized undergraduate outreach events and community optics demonstrations</li> <li>• Coordinated tours of local lens manufacturer and Adler Planetarium for chapter members</li> </ul>	
<b>Director of Outreach</b>   <i>Medical Physics Diversity &amp; Outreach Committee, UChicago</i>	2022 – 2025
<ul style="list-style-type: none"> <li>• Led medical physics outreach demonstrations at science fairs, schools, and community events</li> <li>• Secured grant funding to design and build original CT, MRI, and radiation therapy demos</li> <li>• Worked with UChicago Cancer Center to host professional learning days for public school science teachers and to purchase portable ultrasound unit</li> <li>• Wrote an invited <a href="#">AAPM newsletter article</a> highlighting UChicago's outstanding outreach program</li> </ul>	
<b>President</b>   <i>Graduate Program in Medical Physics, University of Chicago</i>	2022 – 2023
<ul style="list-style-type: none"> <li>• Elected to serve as primary student/faculty liaison and to lead student initiatives</li> <li>• Joined faculty meetings and organized journal club, peer-mentor program, and quarterly socials</li> <li>• Led planning and coordination of the annual student/faculty retreat after a three-year hiatus</li> </ul>	
<b>President</b>   <i>Society of Physics Students, Duke University Chapter</i>	2018 – 2020

- Reestablished chapter, authored constitution and by-laws, secured funding, and designed website
- Launched coding crash courses, career advising sessions, and community outreach programs
- Won national SPS awards: 2019 Distinguished Chapter, 2020 Outstanding Chapter

**Physics Community Outreach Volunteer** | *Physics Department, Duke University* 2017 – 2020

- Performed physics demonstrations for grade-school students at science fairs and field trips

## SCIENCE POLICY EXPERIENCE

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**American Institute of Physics Mather Public Policy Intern** | *U.S. House of Representatives* 2019

- Worked with subcommittees of the House Committee on Science, Space & Technology
- Researched hearing topics (renewable energy, AI, deep sea exploration); wrote briefs for members of Congress
- Met with invited scientists to discuss their work and observe remarks in Congressional hearings
- Analyzed demographics of Capitol Hill briefings using text and regression analyses in Python, presented at the Society of Physics Students internship closing symposium

**Science Policy Intern** | *Niskanen Center, Washington, DC* 2018

- Conducted literature reviews on competing climate modeling techniques and prepared staff briefing
- Developed interactive Bayesian belief networks in Python for intuitive climate model interpretation

## PROFESSIONAL AFFILIATIONS

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**IEEE, Institute of Electrical and Electronics Engineers** | *Student Member* 2025 – present

**UChicago 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

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**Computational:** Bash, C/C++, CUDA, ImageJ, Git, L<sup>A</sup>T<sub>E</sub>X, Linux/Unix, Python, MATLAB, Mathematica, R

**Libraries:** Chromatix, CuPy, Jax, Pandas, NumPy, Matplotlib, Optax, PyCuda, SciPy

**Experimental:** CT, micro-CT, microscopy (DIC, confocal, AFM), electronics, other clinical medical imaging

**Personal interests:** Jazz saxophone, flamenco guitar, language learning, geography, political philosophy

[CV compiled on September 25, 2025]