

CURRICULUM VITAE

André Forjaz

September 2025

1) DEMOGRAPHIC INFORMATION

Current Appointment

September 2021 PhD Candidate, Department of Chemical and Biomolecular Engineering, Johns Hopkins University
Expected completion: Jan 2026

Contact Information

Wirtz Lab, Croft 130
Johns Hopkins University
3400 North Charles Street
Baltimore, MD 21218
Tel: +1 443 563 4799
e-mail: aperei13@jh.edu
twitter: [@andreforjaz](https://twitter.com/andreforjaz)
LinkedIn: <https://www.linkedin.com/in/andreforjaz/>

Awards/ Honors

September 2025 **Siebel Scholar, Class of 2026** – awarded annually for academic excellence and demonstrated leadership to over 80 top students from the world's leading graduate schools.
Johns Hopkins University, Baltimore, Maryland, USA

Education and Training

2021 – **Present** Doctor of Philosophy in Chemical & Biomolecular Engineering
Mentor: Prof. Denis Wirtz
Johns Hopkins University, Baltimore, Maryland, USA

2014 – 2020 Integrated Bachelor's and Master's of Science in Electrical and Computer Engineering
University of Lisbon, Instituto Superior Técnico, Lisbon, Portugal

Professional Experience

2021– **Present** **PhD Researcher**, Denis Wirtz Lab, Johns Hopkins University, Baltimore, Maryland, USA

- Developed a method that integrates CODA with spatial transcriptomics, proteomics, and metabolomics to uncover molecular hallmarks of disease. Applied CODA+ to study nondiseased human fallopian tubes, leading to the discovery that ovarian precancerous lesions are far more prevalent than previously believed, most women will develop these lesions as they age.
- Co-developed InterpolAI, a method to enhance 3D biomedical imaging. This novel tool uses artificial intelligence-based optical flow to restore missing or damaged images within biomedical datasets, improving the quality and resolution of 3D tissue reconstructions. Importantly, InterpolAI has potential applications for speeding up biomedical imaging workflows, reducing costs, and enabling higher-quality visualization of tissues. Work was recently published at *Nature Methods*.
- Developed a deep learning framework to 3D map over 140 anatomical labels across whole fetal organisms. This tool enables high-resolution analysis of developing systems, advancing our ability to study embryogenesis and congenital disease across entire organisms.
- Co-author on 19 papers, including 6 as first author, and has presented at 13 conferences. As part of his research, André has mentored 11 undergraduate and graduate students.

2020 – 2021 **Azure Data Engineer Trainee**, Novabase, Lisbon, Portugal

Contributed to the creation of a cloud-based data infrastructure for a global art insurance firm. Helped implement a Microsoft Azure ecosystem using Terraform for infrastructure-as-code deployment. Managed unstructured data via Azure Data Lake and developed automated workflows with Data Factory and Synapse Analytics. Supported both development and production environments, leveraging Azure DevOps for continuous integration and delivery. Employed tools such as SQL Server Management Studio and Power BI to analyze and visualize business-critical data.

- 2019 – 2020 **Master's Thesis**, Wirtz Lab, Johns Hopkins University, Baltimore, Maryland, USA
Developed an image analysis pipeline to detect tumor-infiltrating lymphocytes (TILs) in H&E-stained images, using a deep learning model trained from immunofluorescence-labeled cells. This approach enables retrospective immune profiling on archival pathology slides, bypassing the need for additional staining.
- Summer 2019 **Visiting Researcher**, Costa Branco Lab, University of Lisbon, Instituto Superior Técnico, Lisbon, Portugal
Contributed to the development of an electric autonomous vehicle by engineering the accelerator pedal system. Focused on mechanical design and component integration to ensure safe and reliable functionality under real-world conditions.

2) PUBLICATIONS

Published/accepted

- [11] Joshi, S. *, **Forjaz, A.** *, Han, K., Shen, Y., Xenos, D., Matelsky, J.K., Wester, B.A., Barrutia, A.M., Kiemen, A.L., Wu, P., & Wirtz, D.. “InterpolAI: Deep learning based optical flow interpolation and restoration of biomedical images for improved 3D tissue mapping.” *Nature Methods* (2025) (*co-first authorship)
- [10] Du, W., Nair, P. , **Forjaz, A.**, Phillip, J. , Wu, P, Wirtz, D. “Selecting the optimal cell migration assay: Fundamentals and practical guidelines.”, *Accepted, Nature Methods* (2025).
- [9] Wu, P., Phillip, J., Du, W., **Forjaz, A.**, Nair, P., Wirtz, D. “Methods to analyze cell migration data: Fundamentals and practical guidelines.”, *Accepted, Nature Methods* (2025).
- [8] Johnson, J. A. I., Stein-O'Brien, G. L., Booth, M., Heiland, R., Kurtoglu, F., Bergman, D. R., Bucher, E., Deshpande, A., **Forjaz, A.**, Getz, M., Godet, I., Lyman, M., Metzcar, J., Mitchell, J., Raddatz, A., Rocha, H., Solorzano, J., Sundus, A., Wang, Y., Gilkes, D., Kagohara, L. T., Kiemen, A. L., Thompson, E. D., Wirtz, D., Wu, P.-H., Zaidi, N., Zheng, L., Zimmerman, J. W., Jaffee, E. M., Chang, Y. H., Coussens, L. M., Gray, J. W., Heiser, L. M., Fertig, E. J. +, Macklin, P. + “*Human interpretable grammar encodes multicellular systems biology models to democratize virtual cell laboratories.*” *Accepted, Cell* (2025).
- [7] **Forjaz, A.**, Vaz, E., Romero, V.M., Joshi, S., Braxton, A.M., Jiang, A.C., Fujikura, K., Cornish, T.C., Hong, S., Hruban, R.H., Wu, P., Wood, L.D., Kiemen, A.L.+ , Wirtz, D. + “Three-dimensional assessments are necessary to determine the true, spatially-resolved composition of tissues.” *Cell Reports Methods* (2025).
- [6] Lyman, M.R., Mitchell, J.T., Raghavan, S., Kagohara, L.T., Huff, A.L., Haldar, S.D., Shin, S.M., Guinn, S., Barrett, B., Longway, G., Hernandez, A., Coyne, E.M., Yuan, X., Andaloori, L., Lai, J., Liu, Y.Z., Karchin, R., Gupta, A., Kiemen, A.L., **Forjaz, A.**, Wirtz, D., Wu, P., Deshpande, A., Lee, J.W., Armstrong, T.D., Azad, N.S., Zimmerman, J.W., Wood, L.D., Anders, R., Thompson, E.D., Jaffee, E.M., Fertig, E.J., Ho, W.J., & Zaidi, N. “Spatial Proteomics and Transcriptomics Reveal Early Immune Cell Organization in Pancreatic Intraepithelial Neoplasia.” *JCI insight* (2025)
- [5] Braxton, A.M., Kiemen, A.L., Grahn, M., **Forjaz, A.**, Parksong, J., Mahesh Babu, J., Lai, J., Zheng, L., Niknafs, N., Jiang, L., Cheng, H., Song, Q., Reichel, R., Graham, S., Damanakis, A.I., Fischer, C.G., Mou, S., Metz, C., Granger, J., Liu, X., Bachmann, N., Zhu, Y., Liu, Y., Almagro-Pérez, C., Jiang, A.C., Yoo, J., Kim, B., Du, S., Foster, E., Hsu, J.Y., Rivera, P.A., Chu, L.C., Liu, F., Fishman, E.K., Yuille, A., Roberts, N.J., Thompson, E.D., Scharpf, R.B., Cornish, T.C., Jiao, Y., Karchin, R., Hruban, R.H., Wu, P., Wirtz+, D., Wood, L.D. +. “3D genomic mapping reveals multifocality of human pancreatic precancers.” *Nature* (2024)
- [4] Kiemen, A., Dbouk, M., Diwan, E.A., **Forjaz, A.**, Dequiedt, L., Baghdadi, A., Madani, S.P., Grahn, M.P., Jones, C., Vedula, S.S., Wu, P., Wirtz, D., Kern, S.E., Goggins, M., Hruban, R.H., Kamel, I.R., & Canto, M.I.. “Magnetic resonance imaging-based assessment of pancreatic fat strongly correlates with histology-based assessment of pancreas composition.” *Pancreas* (2024).
- [3] Kiemen, A.L., Dequiedt, L., Shen, Y., Zhu, Y., Matos, V., **Forjaz, A.**, Campbell, K., Dhana, W., Cornish, T., Braxton, A.M., Wu, P.-H., Fishman, E.K., Wood, L.D., Wirtz, D., Hruban, R.H. “*PanIN or IPMN? Redefining lesion size in 3 dimensions.*” *Am. J. Surg. Pathol.* (2024)
- [2] Kiemen, A.L., **Forjaz, A.**, Sousa, R., Han, K., Hruban, R.H., Wood, L.D., Wu, P., & Wirtz, D. “High-resolution 3D printing of pancreatic ductal microanatomy enabled by serial histology.” *Advanced Materials Technologies* (2024).

[1] A. Crawford*, **A. Forjaz***, I. Bhorkar, T. Roy, D. Schell, V. Queiroga, K. Ren, D. Kramer, J. Bons, W. Huang, G. Russo, M. Lee, B. Schilling, P. Wu, I. Shih, T. Wang, A. Kiemen, D. Wirtz (2023) “Precision-engineered biomimetics: the human fallopian tube.” *Science Advances* (2024). (*co-first authorship)

In Submission

[21] **Forjaz, A.**, Queiroga, V., Li, Y., Hernandez, A., Crawford, A., Qin, X., Zhong, M., Tsapatsis, M., Joshi, S., Kramer, D., Nizet, O., Bea, H., Li, Y., Qin, S., O’Flynn, R., Yang, M., Pratt, B., Wu, F., Gensbigler, P., Blecher, M., Wu, P.H., Kagohara, L.T., Shih, I.M., Zwicker, D., Atkinson, M., Shi, L., Fan, R., Kiemen, A.L., & Wirtz, D. “3D multi-omic mapping of whole nondiseased human fallopian tubes at cellular resolution reveals a large incidence of ovarian cancer precursors.” *bioRxiv*. Submitted *Nature Biotechnology* (2025)

[20] Ren, K.A., Duarte-Alvarado, V., Zhou, X.D., Ho, B., **Forjaz, A.**, Crawford, A.J., Alicea-Rebecca, G.M., Joshi, S., Nair, P., Hanna, E.A., & Wirtz, D. “3D map-guided modeling of functional endometrial tissue using multi-compartment assembloids.” *bioRxiv* (2025)

[19] **Forjaz, A.***, Romero, V.M.*, Reucroft, I.*, Eminizer, M., Kramer, D., Higuera, D., Mojdeganlou, H., Guerrero, P.A., Min, J., Wetzel, M., Lvovs, D., Valentin, A., Shin, S.M., Yuan, X., Sears, R.C., Chin, K., Maitra, A., Fertig, E.J., Ho, W.J., Kagohara, L.T., Wood, L.D., Wirtz, D., Sidiropoulos, D.N., & Kiemen, A.L. PIVOT: an open-source tool for multi-omic spatial data registration. *bioRxiv* (2025) Submitted, *Nature Methods*.

[18] Liu, M. *, Villazon, J.*, **Forjaz, A. ***, Tian, X., Wang, S.†, Shi., L.†, Fan., R.†, Wirtz., D. †, Kiemen, A. “Towards a Holistic 3D Tumor Atlas for Discoveries in Cancer Biology and Clinical Practice.” Under review, *Nature Cancer reviews* (2025) (*co-first authorship)

[17] **Forjaz, A.**, Kramer, D., Shen, Y., Bea, H., Tsapatsis, M., Ping, J., Queiroga, V., Han, K. S., Joshi, S., Grubel, C., Beery, M., Kumartseva, I., Atkinson, M., Kiemen, A., Wirtz, D. (2025). “Integration of nuclear morphology and 3D imaging to profile cellular neighborhoods.” *bioRxiv* (2025) Under review, *Science Advances*.

[16] Matos-Romero V., Gomez-Becerril J., **Forjaz A.**, Dequiedt L., Newton T., Joshi S., Shen Y., Hanna E., Nair P.R., Sivasubramanian A., Wang J., Lasse-Opsahl E.L., Bell A.T.F., Czum J., Steenbergen C., Dai D.F., Wood L.D., Kagohara L.T., Fertig E.J., Pasca di Magliano M., Shatzel J., McCarty O.J., Lo J.O., Rosenberg A., Hruban R.H., Munoz-Barrutia A., Wirtz D., Kiemen A.L. (2025). “CODAvision: best practices and a user-friendly interface for rapid, customizable segmentation of medical images.” *bioRxiv* (2025). Under review, *Nature Protocols*.

[15] Du, W., Zhou, B., **Forjaz, A.**, Shin, S.M., Wu, F., Crawford, A.J., Nair, P.R., Johnston, A.C., West-Foyle, H., Tang, A., Kim, D., Fan, R., Kiemen, A.L., Wu, P.-H., Phillip, J.M., Ho, W.J., Sanin, D.E., Wirtz, D. “High-motility pro-tumorigenic monocytes drive macrophage enrichment in the tumor microenvironment.” *bioRxiv* (2025). Under re-review, *Nature Materials*.

[14] Johnston, A., Alicea, G.M., Lee, C.C., Patel, P., Hanna, E.A., Vaz, E., **Forjaz, A.**, Wan, Z., Nair, P.R., Lim, Y., Chen, T., Du, W., Kim, D., Nichakawade, T.D., Rebecca, V.W., Bonifant, C.L., Fan, R., Kiemen, A.L., Wu, P., Wirtz, D. (2024). “Engineering self-propelled tumor-infiltrating CAR T cells using synthetic velocity receptors.” *bioRxiv* (2024). Under re-review, *Nature*.

[13] Kiemen, A. L., Almagro, C., Matos, V., **Forjaz, A.**, Braxton, A. M., Dequiedt, L., Parksong, J., Cannon, C. D., Yuan, X., Shin, S. M., Babu, J. M., Thompson, E. D., Cornish, T. C., Ho, W. J., Wood, L. D., Wu, P.-H., Muñoz Barrutia, A., Hruban, R. H., Wirtz, D. (2024). “3D histology reveals that immune response to pancreatic precancers is heterogeneous and depends on global pancreas structure.” *bioRxiv* (2024). Under re-review, *Immunity*.

[12] Dequiedt, L., **Forjaz, A.**, Lo, J.O., McCarty, O., Wu, P., Rosenberg, A., Wirtz, D., & Kiemen, A.L. (2023). “Three-dimensional reconstruction of fetal rhesus macaque kidneys at single-cell resolution reveals complex inter-relation of structures.” *bioRxiv* (2024). Under re-review, *Nature Biomedical Engineering*.

3) RESEARCH ACTIVITIES

Professional Societies and Research Centers

2023 – Present Break Through Cancer (BTC)

2022 – Present Cellular Cancer Biology Imaging Research (CCBIR)

2022 – Present USCAP

2022 – Present Society for Biomaterials

Invited Talks

JHMI/Regional:

[1] A Forjaz. (2023, March 31) “Single Cell Mapping of Whole Human Fallopian Tubes with deep learning labelling of secretory and ciliated epithelial cells.” *Poster presentation at Johns Hopkins University Chemical & Biomolecular Engineering Ph.D. student visit weekend.* (Baltimore, MD)

[2] A Forjaz. (2022, April 21). “3D reconstruction of rhesus macaque using CODA.” *Presentation at the laboratory meeting of Robert Johnson’s group, Department of Biology, Johns Hopkins University.* (Baltimore, MD)

[3] A Forjaz. (2024, March 26). “3D mapping of whole human fallopian tubes at cellular resolution.” *Accepted abstract poster presentation at United States and Canadian Academy of Pathology 2024.* (Baltimore, MD)

[4] A Forjaz. (2024, May 15). “Iterative design of human fallopian tube assembloids captures the organ anatomy and physiology.” *Accepted abstract poster presentation at NIH, Cellular Cancer Biology Imaging Research annual meeting, Johns Hopkins University.* (Baltimore, MD)

[5] A Forjaz. (2024, May 17). “Iterative design of human fallopian tube assembloids captures the organ anatomy and physiology.” *Invited talk presentation at NIH, Cellular Cancer Biology Imaging Research, Johns Hopkins University.* (Baltimore, MD)

[6] A Forjaz. (2025, May 28). “3D multi-omic mapping of nondiseased human fallopian tubes at cellular resolution reveals large incidence of ovarian cancer precursors.” *Presented at Vogelstein’s Lab, Johns Hopkins University.* (Baltimore, MD)

National:

[13] A Forjaz. (2025, June 5). “InterpolAI: Deep learning based optical flow interpolation and restoration of biomedical images for improved 3D tissue mapping.” *Invited conference talk at CCBIR, Cellular Cancer Biology Imaging Research annual meeting.* (Northwestern University, IL)

[12] A Forjaz. (2024, November 11). “Demystifying Pancreatic Cancer Therapies.” *Invited conference talk at BTC, Breakthrough Cancer annual meeting.* (MD Anderson Cancer Center, TX)

[11] A Forjaz. (2023, June 7). “Single Cell Mapping of Whole Human Fallopian Tubes with deep learning labelling of secretory and ciliated epithelial cells.” *Accepted abstract poster presentation at NIH, Cellular Cancer Biology Imaging Research annual meeting.* (University of Minnesota, MN)

[10] A Forjaz. (2023, April 20). “3D Mapping of Whole Human Fallopian Tubes at Single-Cell Resolution.” *Accepted abstract presentation at Society for Biomaterial, Computational and Machine Learning Approaches.* (San Diego, CA)

[9] A Forjaz. (2023, March 12). “Single Cell Mapping of Whole Human Fallopian Tubes with deep learning labelling of secretory and ciliated epithelial cells.” *Accepted abstract poster presentation at United States and Canadian Academy of Pathology 2023.* (New Orleans, LA)

[8] A Forjaz. (2023, February 16). “3D Mapping of Whole Human Fallopian Tubes at Single-Cell Resolution.” *Invited Seminar presentation at NIH, Cellular Cancer Biology Imaging Research.* (virtual)

[7] A Forjaz. (2022, February 7). “3D reconstruction of rhesus macaque using CODA.” *Invited presentation to the department of Biomedical Engineering, University of Oregon primate research center.* (virtual)

4) EDUCATIONAL ACTIVITIES

Academic Clubs and Organizations

2023 – Present **Co-Founder of HOPTEC**, Johns Hopkins University and Técnico Lisbon exchange program (<https://hoptec.tecnico.ulisboa.pt/en/>)

- Established HOPTEC, an exchange program connecting Johns Hopkins University and Instituto Superior Técnico in Lisbon, facilitating student participation in cutting-edge research across both institutions.
- Organized monthly online research seminars featuring top researchers from both universities, and generated an archived in a shared repository for prospective students.
- Secured and managed over \$45,000 in funding, distributing grants to catalyze joint scientific projects.
- Directed efforts to provide global educational opportunities, cross-cultural interactions, and enhanced knowledge exchange through this program.

2018 – 2020 **Engineering Team Member for Timing and Scoring**, Portuguese Federation of Triathlon, Lisbon, Portugal

Worked as a member of the Classifications Engineers Team, contributing to the successful execution of triathlon events organized by the Portuguese Triathlon Federation. Oversaw and managed the scoring equipment and its data output in Triathlon races taken in different locations of Portugal.

- 2018 – 2019 **Business Team Leader**, JEEC, University of Lisbon, Instituto Superior Técnico, Lisbon, Portugal
Led a team of 20 individuals to organize an annual degree wide engineering career fair. Coordinated the planning of activities including a job fair, invited speakers, workshops, and career matchmaking sessions. Chose and contacted companies to enroll them in the event and ensure a diverse range of career options were represented.
- 2016 – 2018 **Business Team Member**, JEEC, University of Lisbon, Instituto Superior Técnico, Lisbon, Portugal
Contacted companies to secure their position in a degree-wide engineering career fair part at JEEC [electrical and computer engineering department]

Volunteering

- 2023 – Present **Chapter Leader of PAPS - Portuguese American Post-Graduate Society**, United States
Leads the Maryland, Virginia, and Washington D.C. chapter of PAPS, organizing scientific networking events and fostering academic and cultural exchange across the Portuguese-American research community. Actively builds collaborations and mentorship opportunities to support students and scholars in the U.S. and abroad.
- 2016 – 2018 **Missão país**, Laranjeira, Faro, Portugal
Volunteered with the community of a small village in the countryside for a week each year, giving aid to elderly people, teaching at the local school and promoting the importance of higher education to high school students.
- 2016 – 2017 **Websummit**, FIL, Lisbon, Portugal
Organized registration and check-in for attendees. Engaged with attendees, answering questions and providing information about the event and its exhibitors.
- 2016 – 2017 **Refood**, São Sebastião, Lisbon, Portugal
Volunteered weekly with an organization providing food for disadvantaged populations. Collected food from local restaurants and hotels, assisting in packaging, storage, and transportation of perishable food items.

Mentoring

- 2022 – 2025 **Alfredo Hernandez** (visiting master's thesis researcher); Co-author on a research project to determine clinical hallmarks of ovarian cancer precursors lesions in resected human fallopian tubes using antibody labelling in 3D.
- 2024 – 2025 **Margarita Tsapatsis** (Undergraduate student); Co-author on a research project to determine clinical hallmarks of ovarian cancer precursors lesions in resected human fallopian tubes using antibody labelling in 3D.
- 2022 – 2024 **Inês Reis** (visiting master's thesis researcher); Co-author on a project that developed a 3D mapping technique to map whole mouse Alzheimer's brains and connection to the eye at single cell resolution. Awarded Academic Excellence Diploma for the 2023/2024 academic year, in recognition of achievements during the final year of Master's program.
- 2024 – 2024 **Lea Ping** (Undergraduate student); Co-author on a project to integrate nuclear morphology on 3D imaging methods to study disease progression.
- 2022 – 2023 **Eduarda Vaz, MS** (visiting master's thesis researcher); Co-author on a research project to assess loss in information when measuring 3D anatomical features using subsampled, 2D datasets. Awarded best Master's Thesis at Técnico Lisbon (Maria Lurdes Pintassilgo award). PhD student at Johns Hopkins University, 2023.
- 2022 – present **Vasco Queiroga, MS** (visiting master's thesis researcher); Co-author on a research project to determine clinical hallmarks of ovarian cancer precursors lesions in resected human fallopian tubes. Poster presentation on mapping changes to the female reproductive system with age. PhD student at Johns Hopkins University.
- 2022 – present **Donald Kramer** (master's student); Co-author on a project that developed a 3D reconstruction technique to map whole-organisms at single cell resolution using CODA. Further examined spatial correlations between organs, inter-organ connectivities and organ morphologies. Incoming PhD student at Johns Hopkins University.
- 2022 – present **Saurabh Joshi** (PhD student); First author on an in submission manuscript leveraging generative AI for spatial interpolation to improve the quality, resolution, and efficiency of 3D biological imaging across various modalities.

- 2024 – present **Florin Selaru** (Undergraduate student); Co-author on a project that developed a 3D reconstruction technique to map whole-organisms at single cell resolution using CODA.
- 2025 – present **Marco Costa** (visiting master's thesis researcher); Co-author on a project that developed autonomous annotation on 3D datasets to map whole-organisms at single cell resolution using CODA.
- 2025 – present **Catarina Oliveira** (visiting master's thesis researcher); Co-author on a project to study cellular density changes in whole-organisms at single cell resolution using CODA.