Amy T. Lam

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EDUCATION

Columbia University, New York City, NY | **2010 – 2016**
  PhD, *Biomedical Engineering* | February 2016
  MS, *Biomedical Engineering* | February 2012

California Institute of Technology, Pasadena, CA | **2006 - 2010**
  BS, *Applied Physics* (with Honors) | June 2010

WORK EXPERIENCE

Scientist | **2022 – 2024**

Enable Medicine, Menlo Park, CA

- Technical lead for multimodal human spatial atlas building and curation.
  - Mapped synonyms and ontologies for tissue types, cell phenotypes, diseases, and treatments to facilitate organization and search of the atlas.
  - Set standards for terminology and data quality.
  - Developed tools for automating the curation and data unification process, piloting LLM-based tools on clinical metadata interpretation and organization.
  - Prepared reference datasets including metadata tags and annotations for AI/ML model training and testing.
- Technical lead for Python image processing toolkit.
  - Led a team of scientists to develop an internal library for multi-channel image processing, directly interfacing with internal databases.
  - Library included functions for basic channel operations, artifact detection, tissue detection, stain-based mask generation, NIQE scoring for image quality, among others.
  - Developed methods for working with and processing large image files.
- Performed spatial proteomic analysis for pharmaceutical and academic clients on a variety of tissue types and disease indications.
  - Workflow involved cell and tissue segmentation, quality control, phenotyping, neighborhood and interaction analysis.
- Wrote paper manuscripts, customer-facing blog posts, and tutorials related to spatial analysis of biological data, establishing best practices for working with mid- to high-plex proteomic images.

Application Scientist | **2020 – 2022**

ClearLight Biotechnologies, Sunnyvale, CA

- Designed over 100 lab service projects for customers and potential customers to apply tissue clearing and 3D immunohistochemistry to answer biological questions.
  - Developed biomarker panels and selected antibodies for staining.
- Analyzed customer data and created 3D renderings and videos using Bitplane Imaris software.
- Processed and analyzed terabyte 3D image data files.
- Co-authored a methods chapter on 3D immunofluorescence imaging.

Postdoctoral Scholar   **2015 – 2020**
  Stanford University, Stanford, CA
  Biophysics of Multi-Cellular Patterns Laboratory
  Adviser: Prof. Ingmar Riedel-Kruse
Projects

- Designed a setup for investigating fundamental principles of active matter and controllable swarming using *Euglena gracilis* as a model agent.
  - Developed a programming paradigm for controlling biological/microrobotic swarm agents.
- Designed and built prototype exhibits for interactive biology education for the San Francisco Exploratorium to determine how modes of interactivity affect learning outcomes.
  - One prototype has become a permanent exhibit at the Exploratorium.
- Investigated active self-assembly with genetically modified *E. coli* as a model system.
- Ran user studies on an ultra-low-cost liquid handling robot for STEM education.

Graduate Research Assistant   **2010 – 2015**
  Columbia University, New York City, NY
  Laboratory for Nanobiotechnology and Synthetic Biology
  Adviser: Prof. Henry Hess
Projects

- Studied the underlying principles of dynamically self-assembling systems using molecular motors and cytoskeletal filaments as a model system.
  - Investigated molecular mechanisms of and limitations on force-production, adaptation, and self-healing by designing and implementing proof-of-concept systems.
  - Developed a non-fouling surface coating functionalized with kinesin motor binding sites.
    - Binding strength was tailored to be weak enough to allow the kinesin to adsorb and desorb, but strong enough to support microtubule motility.
  - Controlled the size of structures formed through active self-assembly through motor protein gradient surfaces.
- Determined the entropic cost to adsorption kinetics.
- Compared structures arising from diffusion-driven and actively driven (i.e. propelled) self-assembly.

Summer Undergraduate Research Fellow   **2008 and 2009**
  California Institute of Technology, Pasadena, CA
  Cellular Morphodynamics and Imaging Laboratory
  Adviser: Prof. Chin-Lin Guo

- Designed and created controllable PDMS microenvironments for the study of cellular differentiation and morphogenesis.
- Optimized procedures for photolithography and production of microfluidic devices.
- Performed basic biology lab protocols for gel electrophoresis, culturing cells, PCR, gene amplification, and protein purification.

Summer Undergraduate Research Fellow   **2007**
  California Institute of Technology, Pasadena, CA
  Caltech Nanofabrication Group
  Adviser: Prof. Axel Scherer

- Wrote and debugged software for concurrent control of lab equipment.

PUBLICATIONS

1. *Spatial proteomics of human diabetic kidney disease, from health to class III*. A. Kondo, M. McGrady, D. Nallapothula, H. Ali, A. E. Trevino, **A. T. Lam**, et al., ***Diabetologia***, 1-18 (2024).
2. *emObject: domain specific data abstraction for spatial omics*. E. A. G. Baker, M. Y. Huang, **A. T. Lam**, M. K. Rahim, et al. ***bioRxiv***, 07.543950 (2023).
3. S. L. White, **A. T. Lam**, H. D. Buck. "3D Imaging for Cleared Tissues and Thicker Samples on Confocal and Light-Sheet Microscopes" in *Methods in Molecular Biology: Signal Transduction Immunohistochemistry*, 3rd ed., edited by J. M. Walker and A. E. Kalyuzhny, Springer Nature, 143-161 (2022).
4. *DIY liquid handling robots for integrated STEM education and life science research*. E. Li‡, **A. T. Lam‡**, T. Fuhrmann, L. Erikson, M. Wirth, M. L. Miller, P. Blikstein, I. H. Riedel-Kruse, ***PLoS One***, 17(11), e0275688 (2022).
5. *Scientific Inquiry in Middle Schools by combining Computational Thinking, Wet Lab Experiments, and Liquid Handling Robots*. T. Fuhrmann, D. I. Ahmed, L.Arikson, M. Wirth, M. L. Miller, E. Li, **A. T. Lam**, P. Blikstein, I. H. Riedel-Kruse, ***Interaction Design and Children***, 444-449 (2021).
6. *Pac-Euglena: A Living Cellular Pac-Man Meets Virtual Ghosts*. **A. T. Lam**, J. Griffin, M. Loeun, N. Cira, S. A. Lee, I. H. Riedel-Kruse, ***Proceedings of the 38th Annual ACM Conference on Human Factors in Computing Systems***, 1-13 (2020).
7. *First-hand and immersive full-body experiences with living cells and biotechnology through interactive museum exhibits*. **A. T. Lam**, J. Ma, C. Barr, P. Taylor, I. H. Riedel-Kruse, ***Nature Biotechnology***, 37(10), 1238-1241 (2019).
8. *Polygonal motion and adaptable phototaxis via flagellar beat switching in the microswimmer Euglena gracilis*. A. Tsang, **A. T. Lam**, I. H. Riedel-Kruse, ***Nature Physics***, 14(12), 1216-1222 (2018).
9. *Adaptive non-equilibrium molecular-scale systems with reversibly-bound molecular building blocks*. **A. T. Lam**, S. Tsitkov, Y. Zhang, H. Hess, ***Nano Letters***, 18(2), 1530-1534 (2018).
10. *Device and programming abstractions for spatiotemporal control of active micro-particle swarms*. **A. T. Lam**, K. G. Samuel-Gama, J. Griffin, M. Loeun, L. C. Gerber, Z. Hossain, N. J. Cira, S. A. Lee, I. H. Riedel-Kruse, ***Lab on a Chip***, 17(8), 1442-1451 (2017).
    - Listed as a "HOT" article (top 10% score during peer review)
11. *Cytoskeletal motor-driven active self-assembly in in vitro systems*. **A.T. Lam**, V. VanDelinder, A.M.R. Kabir, H. Hess, G.D. Bachand, and A. Kakugo, ***Soft Matter***, 12(4), 988-997 (2016).
12. *Controlling self-assembly of microtubule spools via kinesin motor density*. **A.T. Lam**, C. Curschellas, D. Krovvidi, and H. Hess, ***Soft Matter***, 10(43), 8731-8736 (2014).
13. *Modeling negative cooperativity in streptavidin adsorption onto biotinylated microtubules*. S. He‡, **A.T. Lam‡**, Y. Jeune-Smith‡, and H. Hess, ‡ indicates equal contribution, ***Langmuir***, 28(29), 10635-10639 (2012).
14. *Nanoscale transport enables active self-assembly of millimeter-scale structures*. O. Idan, **A.T. Lam**, J. Kamcev, J. Gonzales, A. Agarwal, and H. Hess, ***Nano Letters***, 12, 240-245 (2011).

PRESENTATIONS

1. *Directed by light: microswimmer biophysics, swarm programming, and interactive exhibits.* **A. T. Lam**, A. C. H. Tsang, I. Riedel-Kruse, (talk) Molecules, Materials, Devices and Systems in Medicine, New York City, NY (2018).
2. *Compression and release dynamics of an active matter system of Euglena gracilis.* **A. T. Lam**, A. C. H. Tsang, N. Ouellette, I. Riedel-Kruse, (talk) American Physical Society March Meeting, New Orleans, LA (2017).

AWARDS AND HONORS

- **Finalist for the Katharine McCormick Advanced Postdoctoral Scholar Fellowship** – awarded to support women in academic medicine (2018).
- **Morton B. Friedman Memorial Prize** – awarded periodically to an undergraduate or graduate student in the School of Engineering and Applied Sciences at Columbia University who best exhibits Dean Friedman's characteristics of academic excellence, visionary leadership, and outstanding promise for the future (2016).
- **The Yuen-huo Hung and Chao-chin Huang Award in Biomedical Engineering** – given to a graduating doctoral student in the Department of Biomedical Engineering at Columbia University who demonstrated great potential for making significant contributions to the fields of biomedical engineering and public health, and for serving as an ambassador of biomedical engineering (2016).
- Honorable Mention for **National Science Foundation Graduate Research Fellowship** (2011).
- Semi-finalist for **Doris S. Perpall Speaking Competition**, an undergraduate science presentation competition (2009).
- **Alexander P. and Adelaide F. Hixon Prize for Writing** – awarded to an undergraduate student for the best composition in a freshman humanities course. The prize recipient is chosen by a humanities committee (2007).

TEACHING AND MENTORING

Part-time faculty, *Axiom Learning Center*	**2019 – 2022**

- Tutor K-12 students to improve their learning efficiency and executive functioning

Co-mentor for *Motorocracy* **BIOMOD team,** *Columbia University*	**2014**

- Project earned Gold Project Award, 2nd Best Presentation, and the MOLBOT award

Tutor for Star Learning Center, *Goddard Riverside Community Center*	**2013**

- Tutored an elementary school student from low-income household

Teaching assistant, *Columbia University*	**2011 – 2012**

Thermodynamics of Biological Systems

- Ran weekly recitations, created answer keys for homework sets and exams, and graded all assignments

Writing consultant, *Hixon Writing Center, Caltech*	**2007 – 2010**

- Provide one-on-one consultations on any piece written communication, including grants, humanities essays, and applications
- Presented at the Southern California Writing Center's Conference in March 2009

OTHER WORK EXPERIENCE

Treasurer and Board Member, *Art of Practicing Institute*	**2016 – 2019**

- Duties include fundraising, grant writing, and accounting for the 501(c) non-profit Institute

Staff Writer, Intern, *Engineering and Science Magazine*	**2009**

- **Staying Firm Under Pressure**. Amy Lam. *Engineering and Science Magazine*. Fall 2009, 5-6

Editor, *little t* **publication**	**2008 – 2009**

- The Caltech undergraduate guidebook
- Recruited advertisers, book layout, generated content
- The first *little t* in several years to be published on time and within budget

SKILLS

- ***Biological data curation:*** Familiar with synonyms and ontologies for diseases/diagnoses, treatments, tissue types, cell phenotypes, and other EHR fields; data and image QC
- ***Nanofabrication****:* Photolithography; mask design; process development; soft lithography; microfluidics; surface treatment and functionalization
- ***Microscopy****:* Custom light microscope setup; total internal reflection fluorescence (TIRF) microscopy; single-molecule imaging
- ***Instrumentation****:* CAD design (OpenSCAD, Autodesk, LayoutEditor); 3D printing; free space optics; liquid handling robots; user interface (UI) design (Python, Processing)
- ***Biology****:* Cell culture; spatial proteomic analysis (segmentation, cell and image QC, unsupervised clustering based on biomarker expression, phenotyping, neighborhood analysis)
- ***HCI****:* User study design, interviewing
- ***Classical piano****:*
    - Solo recital at Klavierhaus (2013, New York City, NY)
    - Performed as a soloist with the Vienna International Orchestra (2012, Vienna, Austria)
    - Performed in AMEROPA International Music Festival (2010, Prague, Czech Republic)