

William F. Li

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EDUCATION

Massachusetts Institute of Technology

Cambridge, MA

B.S. Physics, Computer Science

2020 – 2024

Minor: Biology

GPA: 5.00/5.00

Advanced Coursework: Mathematical Methods in Nanophotonics (18.369), Computational Biology (6.047), Neurogenomics/Advanced Topics in Artificial Intelligence (6.883), Topics in Computational Molecular Biology (18.418), Fundamentals of Statistics (18.6501), Cellular Neurobiology (7.29)

King High School

Tampa, FL

GPA: 4.00/4.00

2016 – 2020

EMPLOYMENT

Broad Institute of MIT and Harvard

Cambridge, MA

Undergraduate Researcher

2022 – Present

– PI: Professor Manolis Kellis (Computational Biology Group)

– Research topics:

* Genetic basis of Alzheimer’s disease heterogeneity

* Methods for enhancing polygenic score prediction

MIT Research Laboratory of Electronics

Cambridge, MA

Undergraduate Researcher

2020 – 2022

– PI: Professor Marin Soljačić (Photonics and Modern Electro-Magnetics Group)

– Research topics:

* X-ray imaging and detection with nanophotonic scintillators

* Computational imaging with compressed sensing and end-to-end inverse design

PEER-REVIEWED PUBLICATIONS

1. **Li WF**, Arya G, Roques-Carmes C, Lin Z, Johnson SG, Soljačić M. Transcending shift-invariance in the paraxial regime via end-to-end inverse design of freeform nanophotonics. *Optics Express*. 2023;31(15):24260-24272. doi:10.1364/OE.492553. Editors’ Pick.

PREPRINTS

1. Arya G, **Li WF**, Roques-Carmes C, Soljačić M, Johnson SG, Lin Z. End-to-end optimization of metasurfaces for imaging with compressed sensing. *arXiv*. Preprint posted online January 28, 2022. doi:10.48550/arXiv.2201.12348.

MANUSCRIPTS IN PREPARATION

3. **Li WF**, Tanigawa Y, Kellis M. Polygenic dissection of phenotypic heterogeneity in Alzheimer's disease.
2. Tanigawa Y, Sun N, **Li WF**, von Maydell D, Boix CA, Akay LA, Galani K, Mathys H, Bennett DA, Tsai LH, Kellis M. Single-cell Transcriptional Hallmarks and Individual Subtyping for Alzheimer's Disease across 427 Subjects.
1. **Li WF**, Roques-Carmes C, Lin Z, Johnson SG, Soljačić M. X-ray spectroscopy with end-to-end optimized nanophotonic scintillators.

PATENTS

1. Roques-Carmes C, Rivera N, Lin Z, **Li WF**, Soljačić M, inventors; Massachusetts Institute of Technology, assignee. Nanophotonic Scintillators for High-Energy Particles Detection, Imaging, and Spectroscopy. U.S. Provisional Application 63/257,611. October 2021.

PRESENTATIONS

*presenter

6. Tanigawa Y*, Sun N, **Li WF**, Galani K, Mathys H, Bennett DA, Tsai LH, Kellis M. Multi-polygenic score model informs the genetic basis of heterogeneity in Alzheimer's disease. Abstract presented at: Alzheimer's Association International Conference; July, 2023; Amsterdam, Netherlands.
5. **Li WF***, Roques-Carmes C, Lin Z, Johnson SG, Soljačić M. X-ray spectroscopy with end-to-end optimized nanophotonic scintillators. Extended abstract presented at: Conference of Lasers and Electro-Optics; May 10, 2023; San Jose, CA
4. **Li WF***, Tanigawa Y, Kellis M. Polygenic dissection of phenotypic heterogeneity in Alzheimer's disease. Poster presented at: Broad Institute Scientific Retreat; December 13, 2022; Boston, MA.
3. Tanigawa Y*, Sun N, **Li WF**, von Maydell D, Boix CA, Akay LA, Galani K, Mathys H, Bennett DA, Tsai LH, Kellis M. Single-cell transcriptional hallmarks and individual subtyping for Alzheimer's Disease across 430 participants. Abstract presented at: Society for Neuroscience; November 15, 2022; Washington, DC.
2. **Li WF***, Arya G, Roques-Carmes C, Lin Z, Johnson SG, Soljačić M. Angular and Spectral Sparse Sensing With End-to-End Optimized Nanophotonics. Extended abstract presented at: Conference of Lasers and Electro-Optics; May 18, 2022; San Jose, CA.
1. Lin Z, Arya G*, **Li WF**, Roques-Carmes C, Pestourie R, Li Z, Capasso F, Soljačić M, Johnson SG. End-to-end Nanophotonics Inverse Design for Computational Imaging. Extended abstract presented at: Conference of Lasers and Electro-Optics; May 18, 2022; San Jose, CA.

AWARDS

- **Gates Cambridge Scholarship Finalist** 2024
Nominated as one of three applicants by the University of Cambridge Department of Chemistry, then selected as one of around 25 Physical Sciences applicants by the Gates Cambridge Trust.
- **Optics Express Editors' Pick** 2023
6 papers selected from 126 in the mid-July 2023 issue of Optics Express. Awarded to first-author paper "Transcending shift-invariance in the paraxial regime via end-to-end inverse design of freeform nanophotonics."

- **MIT SuperUROP Outstanding Research Award** 2023
2 undergraduates selected from 84 in the MIT Advanced Undergraduate Research Opportunities Program (SuperUROP). Awarded for first-author work “Polygenic dissection of phenotypic heterogeneity in Alzheimer’s disease.” (\$1,000 prize)
- **Eric and Wendy Schmidt Center funded Research and Innovation Scholar** 2022 – 2023
Received SuperUROP funding (\$6,000) from the Eric and Wendy Schmidt Center, which drives research at the interface of machine learning and biology to improve human health.
- **USA Astronomy and Astrophysics Team** 2020
Ranked 8th out of 200+ high school students nationally on the USA Astronomy and Astrophysics Olympiad. Competed as one of ten members of team USA at the 2020 Global e-Competition on Astronomy and Astrophysics.
- **U.S. Physics Team** 2019
20 high school students selected from 4,000+ competitors nationally based on the F=ma contest and the USA Physics Olympiad (USAPhO).
- **2-time USA Mathematical Olympiad (USAMO) Qualifier** 2019, 2020
200–300 high school students selected from 40,000+ competitors nationally based on the American Mathematics Contest 12 (AMC 12) and the American Invitational Mathematics Examination (AIME).
- **Sunshine State Scholar** 2019
3 eleventh-grade students selected from 13,000+ in Hillsborough County, Florida based on teacher evaluations for excellence in science and mathematics.

CLINICAL

- Massachusetts General Hospital** Boston, MA
Volunteer in Patient Transport 2022 – 2024
- Transporting patients. Helping patients and families navigate the hospital. Training new volunteers.
- Byrd Alzheimer’s Institute** Tampa, FL
Biochemistry Research Volunteer, Physician Shadowing in Geriatric Psychiatry 2017, 2023
- Volunteered with Prof. Laura Blair’s research lab to help run biochemical assays.
 - Shadowed Dr. Bishnoi at the Byrd Institute clinic. Observed diagnosis of memory problems and long-term outpatient care of patients with Alzheimer’s disease.
- Brandon Riverview Medical Associates** Brandon, FL
Physician Shadowing in Internal Medicine 2021
- Shadowed Dr. Jagdeep Sandhu. Observed primary care and long-term treatment of COPD, diabetes, and hypertension.

SERVICE

- MIT Department of Physics** 2021 – 2024
Scribe, Tutor
- Problem set scribe to assist a student with a medical disability for Statistical Physics I coursework; student achieved an A+ in the class. Also scribed for the Physics I Classical Mechanics Advanced Standing Exam.
 - Tutored for Physics II Electricity and Magnetism.
- UPchieve** 2022 – 2023
Tutor
- UPchieve is a nonprofit founded in 2016 that has helped 25,000+ low-income students around the country through tutoring and academic support.
 - Tutored low-income students one-on-one in math, biology, and physics.

Students for Open and Universal Learning

2022 – 2023

Biology and Chemistry Lead

- Students for Open and Universal Learning is an MIT student organization that builds open learning resources with the goal of decreasing barriers to education.
- Designed a standard format for collecting data on existing open learning materials to identify areas that need improvements.

LEADERSHIP AND ACTIVITIES

- Undergraduate: Genomics Journal Club (founder, president), MIT Premedical Society (collegiate relations co-chair)
- High School: Florida Student Association of Mathematics (state co-president), Mu Alpha Theta (president), Science National Honor Society (president), Orchestra (all-county principal cello), Swim (varsity team)