William F. Li

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Location: Cambridge, MA

Education

Massachusetts Institute of Technology — Cambridge, MA
B.S. Physics, Computer Science — 2020 – 2024
GPA: 5.00/5.00

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 topic:
  - Genetic basis of Alzheimer's disease heterogeneity

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
- Ongoing work on publications through 2023.

Awards

- **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."
- **U.S. Physics Team** — 2019
  20 high school students selected from over 4,000+ nationally. Selection based on two theoretical physics exams, the F=ma (classical mechanics) and the USA Physics Olympiad (classical mechanics, electromagnetism, relativity, thermodynamics, waves, modern physics).
- **Sunshine State Scholar** — 2019
  3 eleventh-grade students selected from over 12,000+ in Hillsborough County. Selection based on nominations by teachers for excellence in science and mathematics.

Patents and Patent Applications

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.

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. In review.

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.

Conference Talks, Posters, and Abstracts

*presenter

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 of Alzheimer's Disease across 427 Subjects. Abstract presented at: American Society of Human Genetics; October 27, 2022; Los Angeles, CA.

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.

Clinical

Massachusetts General Hospital Boston, MA
Volunteer, Patient Transport 2022 – Present

– Transporting patients. Helping patients and families navigate the hospital. Training new volunteers.

Byrd Alzheimer's Institute Tampa, FL
Physician Shadowing, Geriatric Psychiatry 2023

- Physician: Dr. Ram Bishnoi
- Observing diagnosis of memory problems and long-term outpatient care of patients with Alzheimer's disease.
- First got involved with the Byrd Alzheimer's Institute as a biochemistry research volunteer in high school (2017).

Brandon Riverview Medical Associates Brandon, FL
Physician Shadowing, Internal Medicine 2021

- Physician: Dr. Jagdeep Sandhu
- Observed primary care and long-term treatment of COPD, diabetes, and hypertension.

Volunteering

UPchieve 2022 – Present
Tutor

- UPchieve is a nonprofit founded in 2016 that has helped 25,000+ low-income students around the country through tutoring and academic support.
- Tutoring low-income students one-on-one in math, biology, and physics.

Students for Open and Universal Learning 2022 – Present
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.
- Corresponding with professors of courses in the biology and chemistry departments to make course material freely accessible.

MIT Department of Physics 2023
Scribe

- Problem set scribe to assist a student with a medical disability for Statistical Physics I coursework.
- Student achieved an A+ in the class.

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)