# Marcus Forst

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## Education

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| 2025 | PhD Applied Physics | Stanford University | GPA: 3.56/4.0 |
| 2019 | B.S Physics | Temple University | GPA: 3.99/4.0 |
| 2014 | H.S Valedictorian | Avon Grove High School | GPA: 4.0/4.0 |

## Research Experience

**2025-Present** Research Consultant Dr. Stephen Quake Eleftheria Foundation

- *Capillary microscope*: Designing a microscope to image white blood cells in nailfold capillaries.

**2025-Present** Research Consultant MD David Cornfield Stanford University

- *Genomic analysis*: Using Python to analyze genomic data from human and mouse lung samples.

**2025-Present** Research Consultant MD Jessica Ansari Stanford University

- *Proteomic analysis*: Using Python to analyze proteomic data from human myometrium samples.

**2019-2025** PhD Student Dr. Stephen Quake Stanford University

- *Capillary Microscope*: Designed and built a microscope to videotape blood flowing through people's nailbed capillaries. Invented an inflatable fingerholder to increase pressure on the finger and slow and stop blood flow.
- *Gathering Data*: Wrote IRB to study blood flow in healthy and affected people. Recruited and tested 82 participants.
- *Data Analysis*: Wrote imageJ and Python repository (www.github.com/gt8mar/capillary-flow) to stabilize videos and extract blood flow rate.
- *Mentorship*: Mentored Gabriela Rincon, 2023-2024; Juliette H. Levy and Makai Heussen, summer of 2024 .

**2020** Researcher Dr. Shalin Mehta Chan Zuckerberg Biohub

- *Nautilus Platereader*: Collaborated with Hongquan Li and Ivan Ivanov to design and build a high-throughput open-source ELISA-array platereader for measuring seroprevalence of COVID Antibodies in blood.

**2016-2019** Diamond Scholar Dr. Maria Iavarone Temple University

- *Independent research*: Grew monolayer and bilayer MoS2 films using chemical vapor deposition (CVD). I characterized these films using an Atomic Force Microscope (AFM) before studying their electronic properties using Scanning Tunneling Microscopy/Spectroscopy (STM/STS).
- *Scanning Tunneling Microscope (STM)*: Assisted with STM and ultra high vacuum (UHV) chamber operation and maintenance, Helium Liquidification and transfer, and LEED and Auger Spectroscopy.

**2018-2019** Optics Self-Study Dr. Darius Torchinsky Temple University

- *Sound Wave Movie*: Built a pulsed laser interferometer to make movies of sound waves rippling through a solid.

**2018** Summer Intern Dr. Thorsten Pöschel F.A. Universität Erlangen

- *Pouring Density in a Cylinder*: Analyzed X-ray tomographies of marbles in a cylinder to study their density distribution using C++ and MATLAB.

**2015-2017** Research Assistant Dr. Harsh Chopra Temple University

- *Vibrating Sample Magnetometer (VSM)*: I was the Head Operator and Service Technician of the VSM.
- *Laboratory Assembly*: Set up Dr. Chopra's LINKAM temperature stage, researched and bought laboratory equipment, and helped him build his experimental apparatus.
- *Circuit Design*: Designed and soldered Whetstone Quarter Bridge Circuits to measure how magnets strained when placed in a magnetic field and analyzed the symmetry of magnets using manual Fourier Series analysis.

## Work Experience

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| 2021, 2016-2017 | Tutor | H.S. Physics and Math | Self Employed |
| 2018-date | Peer Recitation Leader | Mechanics I & II, Electrodynamics | Temple University |
| 2017 | Tutor | Physics and Math | Temple University |
| 2017 | Diamond Peer Teacher | Sports and Leisure in American Soc. | Temple University |

## Volunteer Experience

**2019-2022** Knight-Hennessy Scholar Knight-Hennessy Scholars Stanford University

- *Event hosting*: Hosted 2 Halloween Parties, 1 formal and 2 field days. Hosted events explaining fellowship taxes and American football. Hosted weekly film-club events in 2022.

**2020-2021** Scholar Advisory Board (SAB) Member Knight-Hennessy Scholars Stanford University

- *Founding Member*: Created SAB in conversations with John Hennessy and JD Schramm. Gave monthly feedback to Knight-Hennessy Team, worked on the Micro-Community Committee, led 2021 Autumn Townhall to welcome new scholars.

**2017-2019** President, Education Chair Physics Club Temple University

- *Fundraising*: We raised funds to send students to a national physics conference.
- *Outreach Collaborations*: I initiated community outreach collaborations with the Temple Chemistry Society and Temple Refugee Outreach to do demos at local Philadelphia schools.
- *Physics Workshops*: I hosted workshops on soldering, computer programming, GRE prep, and tips-and-tricks for Midterms and Finals.

**2014-2019** Ambassador Honors Admissions and Transitions Team Temple University

- *Prospective Student Visits*: I met with prospective Temple Honors students. I represent physics research and speak about undergraduate research.
- *Accepted Students Day*: I answered questions at Temple's accepted student's day, and spoke during Temple Honors's large presentation.

**2014-2019** Manager Men's Basketball Team Temple University

- *Practice and Individual Workouts*: I assisted with drills and scrimmages, rebounded for Temple players and NBA players, and cleaned the court floors in the morning.

**2016-2019** Founder, Host Avon Grove Talks Avon Grove High School

- *Community Event*: I created a TED Talk-style event that brings alumni, current students, teachers, and community members together so they can share stories and advice.

## Awards

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| 2025 | Department of Applied Physics Graduation Speaker | Stanford University |
| 2020 | 30 under 30 | Temple University |
| 2019 | Knight-Hennessy Scholar | Stanford University |
| 2019 | NSF-GRFP | The National Science Foundation |
| 2018 | Goldwater Scholar | The Barry Goldwater Scholarship Foundation |
| 2018 | Member | Phi Beta Kappa |
| 2017 | Diamond Scholar | Temple University |
| 2017 | Diamond Peer Teacher | Temple University |
| 2015 | Principal Trombone | Philadelphia Youth Orchestra |
| 2014 | Valedictorian | Avon Grove High School |
| 2014 | All-State Orchestra, Trombone | Pennsylvania Music Educators Association |

## Publications

Forst ML, Rincon G, Levy JH, Cornfield DN, and Quake SR. An inflatable "finger-lock" for stabilizing nailfold capillary videos and modulating blood flow velocities. Review of Scientific Instruments. 2025; 96(8):083702.

Byrum JR, Waltari E, Janson O, Guo S-M, Folkesson J, Chhun BB, Vinden J, Ivanov IE, Forst ML, Li H, et al. MultiSero: An Open-Source Multiplex-ELISA Platform for Measuring Antibody Responses to Infection. Pathogens. 2023; 12(5):671.

Saurav TM, Forst ML, Boligitz JA, and Chopra HD. 2017. Contracting non-Joulian magnets. Phys. Rev. B. 95, 174425.

Chopra HD, Ravishankar A, Pacifico MS, Forst ML. 2018. Non-Joulian Magnetostriction and Non-Joulian Magnetism. Phys. Status Solidi B, 1800214.

## Invited Talks

Forst ML. Alexa, make me a medical device. Presented at the T.H.I.N.K. Philips AI Healthcare Conference; 2025 January; Stanford, CA

Forst ML. Giving the finger to blood-pressure tests. Presented at the Mississippi University for Women; 2024 September; Columbus, MS

## Presentations

Forst ML, Rincon G, Levy JH, Cornfield DN, and Quake SR. Effects of Age on Capillaries. Presented at: 2024 Optics and Photonics in Medicine and Biology Gordon Conference; 2024 July; Lewiston, ME

Forst ML, Rincon G, Cornfield DN, Quake SR. Effects of age on human capillaries. Presented at: 2024 BPS Conference; 2024 February; Philadelphia PA
Forst ML, Rincon G, Cornfield DN, Quake SR. Effects of pressure on capillary blood flow. Presented at Stanford University BioX Discovery Expo; 2023 October; Stanford, CA

Forst ML, Quake SR. Giving the finger to blood-pressure tests. Presented at Stanford University Cardiovascular Institute Roundtable; 2022 August; CA

Forst ML, Quake SR. Pressure-controlled Capillaroscopy. Presented at: 2022 Optics and Photonics in Medicine and Biology Gordon Conference; 2022 July; ME

Forst ML. LLS Mission Moment Keynote Speech. Presented at: Leukemia and Lymphoma Society 2019 Students of the Year Grand Finale Celebration; 2019 March 9; PA.

Forst ML, Iavarone M et al. Electronic Properties of Defects in Few-Layer Molybdenum Disulfide Films. Paper presented at: APS March Meeting 2018; 2018 March 5-9; Los Angeles, CA.

Forst ML, Trainer D, and Iavarone M. Growing Large Area, Uniform Monolayer Molybdenum Disulfide. Presented at: 2018 Temple University Undergraduate Research Forum and Creative Works Symposium; 2018 April 12; Philadelphia, PA.

Forst ML, Trainer D, and Iavarone M. Investigating Few Layers Thick Molybdenum Disulfide. Poster session presented at: Temple University Diamond Scholar Poster Day; 2017 July 26; Philadelphia, PA.

Forst ML, Alpert R. A Look at Temple Basketball from the Inside Out. Presented at: 2016 Temple University Undergraduate Research Forum and Creative Works Symposium; 2016 April 14; Philadelphia, PA.

## Clubs/Activities

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| 2023-2025 | Tenor | Church Choir | St. Raymond's Parish, Menlo Park |
| 2022-2023 | Guard | Knight-Hennessy IM Basketball Team | Stanford University |
| 2016-2019 | Member | Rock Climbing Club | Temple University |
| 2014-2015 | Trombone | Philadelphia Youth Orchestra | PYO |
| 2014-2015 | Trombone | Bravo Brass | PYO |
| 2009-Present | Monk, Wizard, DM | Dungeons and Dragons Campaign | Various groups |