Nathan C. Song

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Education

University of California, Berkeley *Berkeley, CA*

B.A. Physics, B.A. Mathematics, GPA: 3.64 *Grad. May 2025 (est.)*

Current Coursework: **Math 185** (Complex Analysis), **Math 170** (Optimization), **Phys 112** (Stat Mech), **Physics 137B** (QM)

Publications:

(Accepted) N. Song, D. Wei, C.K. Harnett, Powering Wire-Mesh Circuits Through MEMS Fiber-Grippers, IEEE FLEPS 2023

(In review) Islam et. al, Thermally Driven MEMS Fiber-Grippers, Journal of Micro and Bio Robotics 2023

Experience

Ultracold Atomic Group | *Undergrad @ E6 w/ Prof. Stamper-Kurn* *January 2024 – Present*

Working with E6 subgroup on neutral Rydberg atom experiments in optical cavities. Setup SLM (Spatial Light Modulator) to generate high-resolution Fourier plane tweezers to explore 'long' / short range atomic interactions. Learning about AMO, image generation / algorithms, and cavity physics.

PARADIM REU @ Johns Hopkins | *Undergrad w/ Prof. McQueen* *June 2023 – August 2023*

Created a metric to predict the propensity of a material to form an oxide layer(s) with ML techniques (XG Boost, Nelder-Mead algo., and CNNs) on JHU's Rockfish supercluster. Applied to ~20k known superconductors from Supercon and ~150k predicted and known materials from the Materials Project. Performed DFT calculations and force-field simulations to explore why oxide layers in Ta and Nb-based qubits contribute ~1/3rd of decoherence loss. **See Git** (*In progress)*

marketGOATS | *Student Ambassador* *November 2022- January 2023*

Course Reader | *ISF 10* *September 2022- December 2022*

IMPACT-NG REU @ U of L | *Undergrad w/ Prof. Harnett* *June 2022 – August 2022*

Created and electrically characterized MEMs (Microelectromechanical) structures that latched onto fiber meshes.

Ultrafast NanoOptics Group | *Undergrad w/ Prof. Wang* *September 2021- May 2022*

Investigated novel properties of 2D materials using optical spectroscopy (+magnetic, electric char.) w/ mentor Zheyu Lu.

Fluxergy | *Junior Web Developer* *April 2021 – August 2022*

Created current Fluxergy.com website while communicating with CEO/Advisory Board, and 2x-ed loading speed.

Activities

Quantum Computing @ Berkeley

Leadership member. Worked w/ small team to make a quantum machine learning model capable of sentiment analysis, and presented at student-run DeepTech conference.

Physics Directed Reading Program

Did a deep reading of Annett's superconductivity covering Bose-Einstein condensates and statistical thermodynamics. Gave departmental presentation at end of semester on Type I/II superconductors.

STEAM For All + PacificSTEM

Outreach programs for schools in Orange County, La Mirada, and Diamond Bar. Wrote 200+ AMC-style problems for biannual tournaments attended by ~250 middle school students and ran monthly workshops for ~16 students on competitive math. Lead student group to find speakers for annual STEM networking event from companies like JPL, Mars Food, and CrowdStrike.

Honors & Awards

The Leadership Award (UC Berkeley) (X3), President's Gold Volunteer Service Award (X2), National Merit Semifinalist, AIME

Skills

Languages: Python, Julia, Mathematica, Rust, Matlab, HTML+CSS

Tools and Frameworks: Pytorch, Pandas, NumPy, nalgebra, Rapier, Seaborn, OpenCV, Matplotlib, LambEq, DiscoPy, Qiskit

Experimental: AFM, Photolithography, PC-film manufacturing, Exfoliation, Photolithography, SEM, Mask Design, Xenon Etching, Metal Deposition, Plasma cleaning, Wet etching, Parylene deposition, NEXUS (See U. of L), Probe station