Nima Leclerc

306 Moore Building
University of Pennsylvania
200 S 33rd St.
Philadelphia, PA 19104

nleclerc@seas.upenn.edu
(415) 312-9219

Education

University of Pennsylvania, Philadelphia, PA
Doctor of Philosophy, Electrical Engineering, 2021-2025
Masters of Science, Electrical Engineering, 2020-2022

Cornell University, Ithaca, NY
Bachelors of Science, Materials Science and Engineering, 2017-2020

San Francisco State University, San Francisco, CA
Bachelors of Science, Mechanical Engineering, 2015-2017

Awards and Honors

Perry World House Graduate Fellowship (2021) · UPenn Dean's Fellowship (2021) · Cornell Engineering Learning Initiative Research Grant (2017) · Cornell Tradition Fellowship (2017) · Caltech Summer Undergraduate Research Fellowship (2017) · Robert L. Pender Memorial Scholarship (2015).

Publications

3. **N. Leclerc**, *Predicting Dynamics of Transmon Qubit-Cavity Systems with Recurrent Neural Networks*, arXiv:2109.14471 (2021).
2. K. Inzani*, N. Pokhrel*, **N. Leclerc**, Z. Clemens, S. Ramkumar, S. Griffin, E. Nowadnick, *Manipulation of spin orientation via ferroelectric switching in Fe-doped* Bi_2WO_6 *from first principles*, "in preparation for Phys. Rev. B" (2021).
1. **N. Leclerc**, *Low-Frequency Noise in III-V Nitride 2D Electron and Hole Gases*, Cornell University (2020).

Conference Presentations and Invited Talks

13. **Electrical Engineering PhD Colloquium**, University of Pennsylvania, Philadelphia, PA (October 2021); presented an invited talk, *High fidelity single and two-qubit gates in silicon quantum processors.*
12. **Kepler Computing Company Presentation**, Kepler Computing, Berkeley, CA (August 2021); presented a talk, *Taming the beasts in ferroelectric memories.*
11. **APS March Meeting 2021**, virtual conference (March 2021); presented a talk, *Electric field of single spins in complex oxides.*
10. **Molecular Foundry User Meeting 2020**, virtual conference (August 2020); presented a poster, *Electric field control of single spins in complex oxides for energy-efficient logic.*
9. **Cornell MSE Honors Thesis Colloquium**, virtual conference (May 2020); presented a talk, *Low-frequency noise in III-V nitride 2D electron and hole gases.*
8. **Quantum Simulations Group Colloquium**, Lawrence Livermore National Laboratory, Livermore, CA (January 2020); presented an invited talk, *Stretching Moore's law: quantum design of materials and devices for classical computation.*
7. **PsiQuantum Company Presentation**, PsiQuantum, Palo Alto, CA (August 2019); presented a talk, *Optimal single-photon detector design.*
6. **MIT IEEE Undergraduate Research Conference**, MIT, Cambridge, MA (October 2018); presented a lightning talk, *Strain Engineering Valleytronic Materials to Preserve State Coherence.*

5. **Molecular Foundry User Meeting 2020**, Lawrence Berkeley National Laboratory, Berkeley, CA (August 2018); presented a poster, *Stretching Moore's Law: Strain Engineering of 2D Valleytronic Materials from First Principles.*
4. **CURBx TED-style Conference**, Cornell University, Ithaca, NY (August 2018); presented an invited talk, *From Quantum Mechanics to Battery Design: Uncovering the Material World with Computation.*
3. **Student-Faculty Programs, Summer Seminar Day**, Caltech, Pasadena, CA (August 2017); presented a talk, *Developing Next-Generation 3D Microbatteries, via Two-Photon Lithography.*
2. **ACS National Meeting 2017**, San Francisco, CA (April 2017); presented a talk, *Understanding Li diffusion behavior in amorphous and crystalline Li3PS4 solid electrolytes, via ab-initio simulations.*
1. **Electrochemical Society Meeting 2016**, Honolulu, HI (October 2016); presented a poster, *DFT Molecular Dynamics Simulations of* Li^+.

Research Experience

Graduate student researcher — University of Pennsylvania
Philadelphia, PA — August 2021-present
Advisor: Prof. Anthony Sigilito
Using optical and electron-beam lithography to fabricate double quantum dot devices on a silicon platform. Spearheading the development of quantum control codebase and quantum compiler. Utilizing pulse engineering techniques for high-fidelity two-qubit gate operations.

Graduate student researcher — University of Pennsylvania
Philadelphia, PA — August 2020-May 2021
Advisor: Prof. Lee Bassett
Developed an infrastructure for efficient search of new spin-qubit candidates. Used density functional theory and analytical models, combined with Bayesian optimization to identify defect-host combinations with optimal coherence times. Wrote section of NSF annual report.

Researcher — Lawrence Berkeley National Laboratory
Berkeley, CA — June 2020-September 2020
Advisor: Dr. Sinéad Griffin
Primary contributor of the codebase Magmango to automate calculation of single-spin magnetic properties from VASP codebase. Developed a working theory for the electric-field control of single spins in ferroelectric hosts using density functional theory and analytical models.

Undergraduate Researcher — Cornell University
Ithaca, NY — December 2017-May 2020
Advisor: Prof. Debdeep Jena
Independently built temperature-dependent low-frequency characterization setup to identify signatures of quantum noise in GaN-AlGaN HEMTs and developed a theoretical noise model for honors thesis. Used Quantum ESPRESSO to predict the phase stability, electronic structure, and mechanical properties of GaN-NbN semiconductor-superconductor interfaces. Developed tight-binding model of the NbN superconductors.

SULI Intern — Lawrence Berkeley National Laboratory
Berkeley, CA — May 2018-August 2018
Advisor: Prof. Jeffrey Neaton
Investigated the effects of strain on the valley lifetime in the 2D transition metal dichalcogenide (TMD) materials from *ab-initio* theory. Implemented density functional theory (DFT) combined with BerkeleyGW to predict the electronic structure of the strained TMDs and used EPW to compute the electron-phonon couplings for valley lifetime predictions.

ELI Fellow — Cornell University
Ithaca, NY — September 2017-December 2017

Advisor: Prof. Richard Robinson
Awarded $1,850 through the Cornell Engineering Learning Initiatives Fellowship (ELI) program to investigate the growth and characterization of the Lithium thiophosphate solid state electrolyte for thin-film batteries. Optimized the thin film sample growth with RF-sputtering, verified desired phase via X-ray photoelectron and X-ray diffraction, and characterized lithium ionic diffusivity with impedance spectroscopy.

SURF Fellow Caltech
Pasadena, CA May 2017-August 2017
Advisor: Prof. Julia Greer
Awarded the Summer Undergraduate Research Fellowship (SURF) to develop 3D Lithium iodide microbatteries scaffolds with two-photon lithography. Improved conformity of lithium anode deposition via electrodeposition. Used density functional theory to predict the thermodynamic stability of phases formed at the battery's surface.

Undergraduate Researcher San Francisco State University
San Francisco, CA August 2015-May 2017
Advisor: Prof. Nicole Adelstein
Spearheaded a project to understand the correlated Li^+ diffusivity in solid state electrolytes via *ab-initio* approaches. Used molecular dynamics and density functional theory to predict the role of octahedral tilts on Li^+ pathways is solid state battery materials. Wrote post-processing code in Python to compute the radial distribution functions, mean-square displacement, and diffusion coefficients from simulation output.

Industry Experience

Research and Development Intern Kepler Computing
Berkeley, CA June 2021-August 2021
Spearheaded modeling and device characterization efforts to minimize to reduce switching voltages of ferroelectric memories. Developed current leakage model that identified synthesis-induced leakage sources and guided new process within the company. Performed low-temperature device leakage measurements to validate model. Built up code for automated experimental setup. Drafted 30 page report on modeling/characterization infrastructure that I developed and delivered a company wide presentation.

Research and Development Intern PsiQuantum
Palo Alto, CA May 2019-August 2019
Developed infrastructure for single-photon-detector design (Detector Design Kit (DDK)). DDK currently used by company as primary design tool for optimal detector design. Developed experiment automation codebase. Identified that line-edge-roughness (LER) is the efficiency-limiting parameter of detectors, allowing for team to focus efforts to minimize LER. Drafted 10 page document on findings and delivered company-wide presentation.

Teaching Experience

Machine Learning Instructor Inspirit AI
Berkeley, CA June 2021-August 2021
Taught basic machine learning principles to high school students.

Head Teaching Assistant University of Pennsylvania
Philadelphia, PA January 2021-May 2021
Head TA for "Fundamentals of linear algebra and optimization" (CIS 515).

Teaching Assistant University of Pennsylvania
Philadelphia, PA August 2020-December 2020
TA for "Fundamentals of linear algebra and optimization" (CIS 515).

Teaching Assistant Cornell University
Ithaca, NY January 2020-June 2020

TA for "Large Scale Machine Learning" (CS 4787).

Math, Science, and Engineering Tutor San Francisco State University
San Francisco, CA September 2015-May 2017
Tutor for at the on campus tutoring center: Campus Academic Resource Program.

Outreach and Policy

Graduate Associate Perry World House, University of Pennsylvania
Philadelphia, PA September 2021-present
Working with policy experts to develop congressional testimony on improving a quantum workforce to be presented to the House Committee on Science, Space and Technology.

Co-Founder Save the Frontline
Ithaca, NY March 2020-October 2020
Co-founded a non-profit organization for PPE distribution across New York City during the COVID-19 pandemic.

Skills

Programming: Python (proficient), C++ (proficient), Mathematica (proficient), MATLAB (proficient).
Scientific Software: Quantum ESPRESSO, VASP, COMSOL, BerkeleyGW, Wannier90, SPICE.
Nanofabrication: Atomic layer deposition, two-photon lithography, sputtering.
Materials characterization: X-ray diffraction, X-ray photoelectron spectroscopy, scanning electron microscopy.
Languages: French (proficient), Farsi (conversational).
Music: Classical piano (18 years), violin (5 years).
Sports: Competitive long-distance running (13 years).

Organizations

Perry World House, Penn Track and Field Club, Penn Science Policy Club, Cornell Track and Field Club, Cornell Undergraduate Research Board, Cornell Piano Society, SFSU NCAA Division II Cross Country Team.