# Yuan Liu, Ph.D.

Assistant Professor
Department of Electrical and Computer Engineering
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## EDUCATION

**Ph.D., Chemical Physics** 2015 – 2020
Department of Chemistry, Brown University

**M.Sc., Electrical & Computer Engineering** 2016 – 2018
School of Engineering, Brown University

**B.S., Physics** (with honors) 2011 – 2015
Department of Physics, Tsinghua University

## ACADEMIC APPOINTMENTS

**Assistant Professor, NC State University**, Raleigh NC January 2024 - present
Department of Electrical and Computer Engineering, Department of Computer Science

**Adjunct Professor, NC State University**, Raleigh NC March 2024 - present
Department of Physics

**Postdoctoral Associate, Massachusetts Institute of Technology**, Cambridge MA July 2020 - December 2023
Department of Physics, Research Laboratory of Electronics

## HONORS & AWARDS

- Scialog Fellow on Quantum Information & Matter, 2025-2027.
- ECE Rising Star Award, NC State University, 2025
- William R. Potter Prize (highest honor), Brown University, May 2020
- Presidential Fellowship, Brown University, 2015 - 2018
- Sigma Xi Award, Brown University, 2019
- Tsinghua Academic Talent Scholarship, Tsinghua University, 2013 - 2015

## PUBLICATIONS

∗ Equal contribution. † Corresponding author. ‡ Liu Advisee.

*Under review and In preparation*

[U11] CV-DV Team and **Y. Liu**†. *Hybrid continuous-discrete-variable quantum computing: a guide to utility.* To be submitted (2025).

[U10] A. Majumdar‡ and **Y. Liu**†. *Generalized Quantum Signal Processing Interferometry for Quantum Sensing with Prior Information.* In preparation (2025).

[U9] E. R. Das‡, V. Albert, **Y. Liu**†. *Molecular Phase Space: A Quantum Information Perspective.* In preparation (2025).

[U8] K. Joven‡, E. R. Das‡, J. Bierman‡, A. Majumdar‡, Mas Hakimi Heris‡, **Y. Liu**†. *Scalable Quantum Computational Science: A Perspective from Block-Encodings and Polynomial Transformations*. Under review at APL Computational Physics (2025).

[U7] S. Mohapatra, **Y. Liu**, E. Zhang. H. Zhou. *HyQBench: A Benchmark Suite for Hybrid CV-DV Quantum Computing*. Submitted to IEEE ISCA '26.

[U6] Xi Lu‡, Bojko N. Bakalov, **Y. Liu**†. *Efficient Qubit Simulation of Hybrid Oscillator-Qubit Quantum Processors.* To be submitted to PRX Quantum (2025).

[U5] J. Bierman‡, **Y. Liu**†. *Towards Utility-Scale Electronic Structure with Sample-Based Quantum Bootstrap Embedding.* Under review on Digital Discovery (2025).

[U4] B. Goldstein-Gelb*‡, K. Liu*, J. M. Martyn, H. Zhou, Y. Ding, **Y. Liu**†. *COMPAS: A Distributed Multi-party SWAP Test for Parallel Quantum Algorithms*. Under review in ASPLOS '26.

[U3] Xi Lu‡, Bojko N. Bakalov, **Y. Liu**†. *Quantum Coherent State Transform on Continuous-Variable Systems.* arXiv preprint (2025).

[U2] Xi Lu‡, **Y. Liu**, Hongwei Lin. *Quantum Signal Processing and Quantum Singular Value Transformation on $U(N)$*. Under review in Quantum.

[U1] A. K. Tan†, **Y. Liu**†, C. M. Tran†, I. L. Chuang. *Error Correction of Quantum Algorithms: Arbitrarily Accurate Recovery Of Noisy Quantum Signal Processing*. arXiv preprint (2023).

### *Journal Articles*

[34] **Y. Liu**. *Quantum Computing Today: A Status Overview*. In press, IEEE Computer Magazine (2025).

[33] Luke Bell, Yan Wang, Kevin C. Smith, **Y. Liu**, Eugene Dumitrescu, S. M. Girvin. *Co-Designing Spectral Transformation Oracles with Hybrid Oscillator-Qubit Quantum Processors: From Algorithms to Compilation*. Accepted to PRX Quantum (2025).

[32] **Y. Liu***, Shraddha Singh*, Kevin C Smith*, Eleanor Crane, John M Martyn, Alec Eickbusch, Alexander Schuckert, Richard D Li, Jasmine Sinanan-Singh, Micheline B Soley, Takahiro Tsunoda, Isaac L Chuang, Nathan Wiebe, Steven M Girvin. *Hybrid Oscillator-Qubit Quantum Processors: Instruction Set Architectures, Abstract Machine Models, and Applications*. Accepted as Tutorial to PRX Quantum (2025).

[31] Alan Bidart, Prateek Vaish, Tilas Kabengele, Yaoqi Pang, **Y. Liu**, and Brenda M. Rubenstein. *Quantum Computing Beyond Ground State Electronic Structure: A Review of Progress Toward Quantum Chemistry Out of the Ground State*. Accepted to Annu. Rev. Phys. Chem. (2025).

[30] **Y. Liu**†*, John M. Martyn*, Jasmine Sinanan-Singh, Kevin C. Smith, Steven M. Girvin, Isaac L. Chuang. *Toward Mixed Analog-Digital Quantum Signal Processing: Quantum AD/DA*

*Conversion and the Fourier Transform*. IEEE Transactions on Signal Processing, **73**, 3641-3655 (2025).

[29] John M Martyn, Zane M Rossi, Kevin Z Cheng, **Y. Liu**, Isaac L Chuang *Parallel Quantum Signal Processing Via Polynomial Factorization*. Quantum 9, 1834 (2025).

[28] Jeffery Yu, **Y. Liu**, Sho Sugiura, Troy Van Voorhis and Sina Zeytinoğlu. *Clifford circuit based heuristic optimization of fermion-to-qubit mappings*. J. Chem. Theory Comput. **21**, 19, 9430–9443 (2025).

[27] Victor M. Bastidas*, Nathan Fitzpatrick*, K. J. Joven, Zane M. Rossi, Shariful Islam‡, Troy Van Voorhis, Isaac L. Chuang, **Yuan Liu**†. *Unification of Finite Symmetries in Simulation of Many-body Systems on Quantum Computers*. Phys. Rev. A **111**, 052433 (2025).

[26] Nam Vu, Daniel Dong‡, Xiaohan Dan, Ningyi Lyu, Victor Batista†, **Y. Liu**†. *A Computational Framework for Simulations of Dissipative Non-Adiabatic Dynamics on Hybrid Oscillator-Qubit Quantum Devices*. J. Chem. Theory Comput. **21**, 13, 6258-6279 (2025).

[25] J. Sinanan-Sign*, G. L. Mintzer*, I. L. Chuang, **Y. Liu**†. *Single-shot Quantum Signal Processing Interferometry*. Quantum **8**, 1427 (2024). NC State News Press.

[24] J. Ang *et al.* *ARQUIN: Architectures for Multinode Superconducting Quantum Computers*. ACM Transactions on Quantum Computing **5**, 3 (19), 1-59 (2024).

[23] A. K. Tan†, **Y. Liu**†, C. M. Tran†, I. L. Chuang. *Perturbative Model of Noisy Quantum Signal Processing*. Phys. Rev. A **107**, 042429 (2023)

[22] **Y. Liu**†, O. Meitei, Z. E. Chin, A. Dutt, M. Tao, I. L. Chuang, T. Van Voorhis†. *Bootstrap Embedding on a Quantum Computer*. J. Chem. Theory Comput. **19**, 8, 2230–2247 (2023).

[21] D. F. Yuan, **Y. Liu**, Y. R. Zhang, L. S. Wang. *Observation of a Polarization-Assisted Dipole-Bound State*. J. Am. Chem. Soc. **145**, 9, 5512–5522 (2023).

[20] J. M. Martyn, **Y. Liu**, Z. E. Chin, I. L. Chuang. *Efficient Fully-Coherent Quantum Signal Processing Algorithms for Real-Time Dynamics Simulation*. J. Chem. Phys. **158** (2), 024106 (2023)

[19] B. Foulon, K. G. Ray, C. Kim, **Y. Liu**, V. Lordi, and B. M. Rubenstein. *$1/\omega$ Electric-field Noise in Surface Ion Traps from Correlated Adsorbate Dynamics*. Phys. Rev. A **105** (1), 013107 (2022).

[18] **Y. Liu**†, J. Sinanan-Singh, M. Kearney, G. Mintzer, I. Chuang. *Constructing Qudits from Infinite Dimensional Oscillators by Coupling to Qubits*. Phys. Rev. A **104**, 032605 (2021). **Editors' Suggestion**.

[17] D. F. Yuan, Y. R. Zhang, C. H. Qian, **Y. Liu**, L. S. Wang. *Probing the Dipole-Bound State in the 9-Phenanthrolate Anion by Photodetachment Spectroscopy, Resonant Two-Photon Photoelectron Imaging, and Resonant Photoelectron Spectroscopy*. J. Phys. Chem. A **125**, 14, 2967–2976 (2021).

[16] **Y. Liu**, G. Z. Zhu, D. F. Yuan, C. H. Qian, Y. R. Zhang, B. M. Rubenstein, and L. S. Wang. *Observation of a Symmetry-Forbidden Excited Quadrupole-Bound State*. J. Am. Chem. Soc. **142**, 47, 20240–20246 (2020).

[15] T. Shen, **Y. Liu**, Y. Yang, B. M. Rubenstein. *Finite Temperature Auxiliary Field Quantum Monte Carlo in the Canonical Ensemble*. J. Chem. Phys. **153**, 204108 (2020).

[14] D. F. Yuan*, **Y. Liu***, C. H. Qian, G. S. Kocheril, Y. R. Zhang, B. M. Rubenstein, and L. S. Wang. *Polarization of Valence Orbitals by the Intramolecular Electric Field From a Diffuse Dipole-Bound Electron*. J. Phys. Chem. Lett. **11**, 18, 7914–7919 (2020).

[13] D. F. Yuan*, **Y. Liu***, C. H. Qian, Y. R. Zhang, B. M. Rubenstein, and L. S. Wang. *Observation of a $\pi$-type Dipole-Bound State in Molecular Anions*. Phys. Rev. Lett. **125**, 073003 (2020).

[12] **Y. Liu**, T. Shen, H. Zhang, and B. M. Rubenstein. *Unveiling the Finite Temperature Physics of Hydrogen Chains via Auxiliary Field Quantum Monte Carlo*. J. Chem. Theory Comput. **16** 7, 4298–4314 (2020).

[11] B. L. Foulon, **Y. Liu**, J. K. Rosenstein, and B. M. Rubenstein. *A Language for Molecular Computation* (invited preview). Chem **5** (12), 3017 (2019).

[10] G. Z. Zhu, L. F. Cheung, **Y. Liu**, C. H. Qian, and L. S. Wang. *Resonant Two-Photon Photoelectron Imaging and Intersystem Crossing from Excited Dipole-Bound States of Cold Anions*. J. Phys. Chem. Lett. **10** (15), 4339 (2019).

[9] **Y. Liu**, C. G. Ning and L. S. Wang. *Double- and Multi-Slit Interference in Photodetachment from Nanometer Organic Molecular Anions*. J. Chem. Phys. **150** (24), 244302 (2019).

[8] **Y. Liu**, M. Cho, and B. M. Rubenstein. *Ab Initio Finite Temperature Auxiliary Field quantum Monte Carlo*. J. Chem. Theory Comput. **14**, 9, 4722 (2018).

[7] G. Z. Zhu, **Y. Liu**, Y. Hashikawa, Q. F. Zhang, Y. Murata, and L. S. Wang. *Probing the Interaction between the Encapsulated Water Molecule and the Fullerene Cages in $H_2O@C_{60}^-$ and $H_2O@C_{59}N^-$*. Chemical Science, **9**, 5666 (2018).

[6] G. Z. Zhu, Y. Hashikawa, **Y. Liu**, Q. F. Zhang, L. F. Cheung, Y. Murata, and L. S. Wang. *High-Resolution Photoelectron Imaging of Cryogenically-Cooled $C_{59}N^-$ and $(C_{59}N)_{22}^-$ Azafullerene Anions*. J. Phys. Chem. Lett. **8**, 6220 (2017).

[5] G. Z. Zhu, **Y. Liu** and L. S. Wang. *Observation of Excited Quadrupole-Bound States in Cold Anions*. Phys. Rev. Lett. **119**, 023002 (2017).

[4] D. L. Huang, G. Z. Zhu, **Y. Liu**, and L. S. Wang. *Photodetachment Spectroscopy and Resonant Photoelectron Imaging of Cryogenically-cooled Deprotonated 2-hydroxypyrimidine Anions*. J. Mol. Spectrosc. **332**, 86 (2017).

[3] **Y. Liu** and C. G. Ning. *Calculation of Photodetachment Cross Sections and Photoelectron Angular Distributions of Negative Ions Using Density Functional Theory*. J. Chem. Phys. **143**, 144310 (2015).

[2] H. T. Liu, D. L. Huang, **Y. Liu**, L. F. Cheung, P. D. Dau, C. G. Ning, and L. S. Wang. *Vibrational State-Selective Resonant Two-Photon Photoelectron Spectroscopy of $AuS^-$ via a Spin-Forbidden Excited State*. J. Phys. Chem. Lett. **6**, 637 (2015).

[1] **Y. Liu**, L. F. Cheung and C. G. Ning. *Assessment of Delocalized and Localized Molecular Orbitals through Electron Momentum Spectroscopy*. Chin. Phys. B **23**, 063403 (2014). Editors' Suggestion.

### *Conference Articles*

[4] Z. Chen, J. Li, M. Guo, H. Chen, Z. Li, J. Bierman‡, Y. Huang, H. Zhou, **Y. Liu**, E. Zhang. *Genesis: A Compiler for Hamiltonian Simulation on Hybrid CV-DV Quantum Computers*. The 52nd Annual International Symposium on Computer Architecture 2025 (ISCA '25).

[3] Aishwarya Majumdar[‡], Bojko N. Bakalov, Dror Baron, and **Y. Liu**[†]. *Implementing Finite Impulse Response Filters on Quantum Computers*. 2025 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP).

[2] Amey Meher, **Y. Liu**, Huiyang Zhou. *Error Mitigation of Hamiltonian Simulations from an Analog-based Compiler (SimuQ)*. 5th IEEE International Conference on Quantum Computing and Engineering (QCE), 2024.

[1] Tarini S. Hardikar, Kenneth Heitritter, James Brown, Ruhee D'Cunha, Abhishek Mitra, Shaun Weatherly, **Y. Liu**, Matthew Otten, Troy Van Voorhis, Laura Gagliardi, and Kanav Setia. *Quanta-Bind: A quantum computing pipeline for strongly correlated systems for Alzheimer's disease*. 5th IEEE International Conference on Quantum Computing and Engineering (QCE), 2024.

## THESIS

Ph.D. Thesis (Advisors: Brenda M. Rubenstein, Lai-Sheng Wang): *Finite Temperature Physics of Molecules and Solids via Auxiliary Field Quantum Monte Carlo and Observation of p-Type Dipole-Bound States Near the Molecular Threshold.*

B.S. Thesis (Advisor: Chuan-Gang Ning): *Calculation of Photoelectron Angular Distributions.*

## SELECTED CONFERENCE and SYMPOSIUM Presentations

- (Invited) Minisymposia: Quantum Scientific Computing in Engineering, the 9th Asian Pacific Congress on Computational Mechanics/The 7th Australasian Conference on Computational Mechanics (APCOM-ACCM 2025), Brisbane, Australia, 2025.
- Talk on "Unification of finite symmetries in the simulation of many-body systems on quantum computers", Conference on Quantum Simulation (QSim 2025), New York, August 4-8, 2025.
- (Invited) Invited talk on "$U(N)$ quantum signal processing and infinite-dimensional quantum linear algebra" at the Minisymposium SIAM-AN25: "Quantum Linear Algebra and Quantum Algorithms" (AN25), Montréal, Québec, Canada, July 28 - August 1, 2025.
- (Tutorial) Tutorial on "Hybrid Oscillator-Qubit Quantum Processors: Instruction Set Architecture, Abstract Machine Models, and Applications", International Symposium of Computer Architecture (ISCA 2025), Tokyo, Japan, June 21-25, 2025.
- (Invited) Talk on "Towards Modular Quantum Software Systems via Quantum Signal Processing", DIMACS workshop on Quantum Software Systems and Theory, Rutgers University at New Brunswick, New Jersey, May 16, 2025.
- Talk on "Unification of finite symmetries in simulation of many-body systems on quantum computers" at the Quantum Computing Theory in Practice (QCTiP) conference, Berlin, Germany, April 23-25, 2025.
- (Tutorial) Organizer and presenter of APS March-April Meeting (Global Physics Summit) Tutorial on "Hybrid Continuous-Discrete Variable Quantum Computation", Anaheim CA, March 2025 (together with speakers from IBM, ETH Zurich, UMass Amherst).
- (Invited) Southeast Quantum Workshop, Talk on "Hybrid Oscillator-Qubit Quantum Processors: Instruction Set Architectures, Abstract Machine Models, and Applications", University of Tennessee, Knoxville, November 2024.

- QuantumOS Workshop (QuantumOS), Poster on "Protocols and Applications of Quantum Stack Memory", Austin TX, October 2024.
- Southwest Quantum Information and Technology Workshop (SQuInT), Talk on "Hybrid Oscillator-Qubit Quantum Processors: Instruction Set Architectures, Abstract Machine Models, and Applications", organized by the Center for Quantum Information and Control (CQuIC), Boulder CO, October 2024.
- (Invited) Workshop on Quantum Computation Beyond Gate-model, "Hybrid Oscillator-Qubit Quantum Processors: Instruction Set Architectures, Abstract Machine Models, and Applications", QuICS, University of Maryland, October 2024.
- (Invited) 4th Annual Quantum Symposium at NC State University, "Toward Mixed Analog-Digital Quantum Signal Processing", Raleigh, NC, June 2024.
- American Conference on Theoretical Chemistry (ACTC), "Bootstrap embedding on a quantum computer", Chapel Hill, June 2024.
- (Invited) APS March Meeting, "Opportunities and challenges of bosonic oscillators for quantum computation and information processing", in the "From NISQ to Fault Tolerance" Symposium, March 2024, Minneapolis MN.
- (Theory Keynote) Co-Design Center for Quantum Advantage ($C^2QA$) All Hands Meeting, "Instruction Set Architecture and Abstract Machine Models for Hybrid Oscillator-Qubit Processors", Department of Energy, October 2023.
- Quantum Sensing Gordon Research Seminar, "Quantum Advantage in Continuous-Variable Algorithmic Sensing", Les Diablerets, VD, Switzerland, July 2023.
- (Invited) ACS Northeast Regional Meeting (NERM), "New quantum algorithms for old challenges: from real-time dynamics to electronic structure theory", Boston, June 2023.
- Flash talk at the Co-Design Center for Quantum Advantage ($C^2QA$) all hands meeting, "Bootstrap Embedding on a Quantum Computer", Yale University, October 2022.
- Conference on Quantum Information and Quantum Control IX (CQIQC-IX), "Constructing qudits from infinite-dimensional oscillators by coupling to qubits", September 2022, Toronto.
- American Chemical Society Fall Meeting, "Efficient-Fully Coherent Hamiltonian Simulation", August 2022, Chicago.
- American Chemical Society Fall Meeting, "Observation of a symmetry-forbidden excited quadrupole-bound state", August 2022, Chicago.
- IBM-MIT Quantum Information Theory Meeting, "Efficient-Fully Coherent Hamiltonian Simulation", March 2022, Massachusetts Institute of Technology, Cambridge MA.
- American Physical Society March Meeting, "Constructing Qudits from Infinite Dimensional Oscillators by Coupling to Qubits", March 2021, Virtual.
- MIT-NTT Quantum Information Group Meeting, "Constructing Qudits from Infinite Dimensional Oscillators by Coupling to Qubits", February 2021, Virtual.
- American Physical Society National Meeting, "Ab initio Finite Temperature Auxiliary Field Quantum Monte Carlo", March 2018, Los Angeles CA.

## SELECTED INVITED SEMINARS

- Quantum Engineering Seminar, "Quantum Computing with Qubits and Oscillators", Georgia Institute of Technology, Atlanta GA, October 24, 2025.
- QMSI Seminar, "From Embedding to Hybrid Architectures: New Frontiers in Quantum Simulation with Qubits and Oscillators", Quantum Material and Sensing Institute, Northeastern University, Boston MA, October 10, 2025.
- Physical Chemistry Lecture, "From Group Structure to Hybrid Architectures: New Frontiers in Quantum Simulation with Qubits and Oscillators", Department of Chemistry, Brown University, Providence RI, October 9, 2025.
- Quantum Seminar, "Power of Hybrid Continuous-Discrete-Variable Quantum Signal Processing: Controls, Algorithms, and Applications", Department of Physics, Virginia Tech, August 2025.
- *Hybrid Continuous-Discrete-Variable Quantum Signal Processing: Algorithms and Applications*:
  - Quantum Meets Mathematics, Ohio State University, May 22, 2025.
  - Quantinuum, Cambridge, UK, May 9, 2025.
  - University of Innsbruck and IQOQI, Innsbruck, UK, May 6, 2025.
  - Quantum optics seminar, Niels Bohr Institute, University of Copenhagen, Denmark, May 2, 2025.
  - Department of Mathematics, Technical University of Munich, Germany, April 28, 2025.
- Physics colloquium, "Unleashing the power of quantum computation with oscillators and qubits", Virginia Commonwealth University, Richmond, VA, Feb 7, 2025.
- Seminar, "Opportunities and Challenges of Quantum Sensing for Health", ASSIST Center, North Carolina State University, October 2024
- Colloquium, "Quantum Signal Processing Interferometry: Pushing the Limit of Sensing with Quantum Algorithms", North Carolina State University, Department of Electrical and Computer Engineering, August 2024.
- Condensed Matter Seminar, "Opportunities and challenges of bosonic oscillators for quantum computation and information processing", University of Tennessee at Knoxville, May 2024, Knoxville TN.
- "New Quantum Algorithms for Old Challenges: From Quantum Simulation to Quantum Sensing", Oak Ridge National Laboratory, TN, April 2024.
- *New Quantum Algorithms for Old Challenges: From Quantum Simulation to Quantum Error Correction*:
  - Quantum Information Seminar, University of Cambridge, Cambridge UK, February 2024.
  - CAMM & Condensed Matter Physics Seminar, The University of Tennessee, Knoxville TN, November 2023.
  - Hong Kong University of Science and Technology, April 2023.

- Triangle Quantum Computing Seminar, "Error Correction of Quantum Algorithms: Arbitrarily Accurate Recovery of Noisy Quantum Signal Processing", Duke University, March 2023.
- *Toward efficient, scalable, and robust quantum algorithms for chemical physics*:
  - North Carolina State University, March 2023.
  - Physics colloquium, Virginia Tech, February 2023.
- *Bootstrap Embedding on a Quantum Computer*:
  - Quantum Seminar at IBM Research, Cambridge MA, February 2023.
  - QuEra Computing Inc., November 2022.
- Seminar (virtual) at the InQubator for Quantum Simulation, "Efficient-Fully Coherent Quantum Signal Processing Algorithms for Real-Time Dynamics Simulation", University of Washington, November 2022.
- Quanta Research Laboratory, "Double- and Multi-slit Interference of Photoelectrons from Organic Molecular Anions", Massachusetts Institute of Technology, February 2020, Cambridge MA.

## TEACHING

- (New course) Instructor, ECE 492 (061) / ECE 592 (061) / CSC 491 (007) *Introduction to Quantym System Engineering*, NC State University, Fall 2025. *(Created a new undergrad-level course to introduce the field of quantum information science and engineering to Engineering undergraduate students.)*
- (New course) Instructor, ECE 792-066 / CSC 791-025 *Quantum Algorithms for Physical Sciences*, NC State University, Spring 2024, 2025. *(Created a new graduate-level course on quantum algorithms and applications to physical science simulation in the Departments of Electrical & Computer Engineering and Computer Science.)*
- ECE 804 *Seminar in Communication and Signal Processing*, Fall 2024.
- Kaufman Teaching Certificate Program, Massachusetts Institute of Technology, Fall 2021. *(A semester-long workshop on developing teaching skills systematically, with two micro-teaching demonstrations in a real classroom setting)*

## POSTDOCS & STUDENTS

**Postdocs:**

- Joel Bierman, postdoc, NC State, May 2024 - present

**Graduate students:**

- Kevin Joven, PhD (Electrical & Computer Engineering), NC State – 2025 Fall - present
- Aishwarya Majumdar, PhD (Electrical & Computer Engineering), NC State – 2024-present
- Elin Ranjan Das, PhD (Electrical & Computer Engineering), NC State – 2024-present
- Mas Hakimi Heris, PhD (Electrical & Computer Engineering), NC State – 2025-present
- Fucheng Guo, PhD (Computer Science, co-advise with Dr. Frank Mueller), NC State – 2025-present

**Undergraduate Students**:

- Loren Holl (Computer Science, 2025), NC State University
- Coleman Hines (Mathematics, 2028), NC State University
- Alexay Mehra, Undergrad '28 (Computer Engineering), Grand Challenges Scholars Program, Summer 2025.

**Former Group Members**:

- Brayden Goldstein-Gelb (Computer Science, 2025), Brown University
- Shariful Islam, PhD (Physics), NC State – 2024 - Sept 2025
- Xi Lu, Ph.D. in Mathematics, Zhejiang University, Visiting scholar in the group July 2024 - August 2025.
- Weiyi An, Undergrad (Optoelectronic Information Science and Engineering), Huazhong University of Science and Technology, July - August 2025 (GEARS)
- Jiaqi Chai, Undergrad (Optoelectronic Information Science and Engineering), Southern University of Science and Technology (SUSTech), July - August 2025 (GEARS)
- Chenfeng Yang, Undergrad (Computer Science), City University of Hong Kong, July - August 2025 (GEARS)
- Kagwe Muchane (Computer Science, NC State), McNair Scholar, May-July 2025
- Daniel Dong, Masters (Computer Science) – 2024-2025
- Rosalie Rutten (Computer Science, August 2024 - May 2025)
- Nathan Woodward, visiting research scholar (ECE), NC State, June 2024 - April 2025
- Langxu Bai, Undergrad (Physics), Nankai University, 2024
- Anthony Donelli, Undergrad (Computer Engineering, 2025)
- Ruofei Liu, Undergrad (Mathematics and Physics + Mechanical Engineering), Tsinghua University, Jan-Feb 2025 (GEARS)
- Han Hao, Undergrad (TAQ Honor Program of Physics), Jilin University, Jan-Feb 2025 (GEARS)
- Anna Andriiko (Computer Science, 2024)
- Jiyuan Liu, undergrad (Physics), Huazhong University of Science and Technology (HUST), Jan-Feb 2025 (GEARS)
- Manideepika Reddy Myaka, Masters (Computer Science), NC State – 2024
- Leonard Li, Undergrad (Computer Science & Technology), Nanjing University, July 2024 (GEARS)
- Lingjun Xiong, Undergrad (Physics), Huazhong University of Science and Technology (HUST), July 2024 (GEARS)
- Nitin Joseph, Masters (Electrical & Computer Engineering), NC State – 2024
- Mihir Nikam, Masters (Computer Science), NC State – 2024

## LEADERSHIP, SERVICE & OUTREACH

**NC State**

- Co-chair (Fall 2024 and Spring 2025) and Committee Member (Fall 2024 - present), ECE Department Colloquium
- Member, Search Committee for the Head of Department of Computer Science, Fall 2025 - Spring 2026

**Beyond NC State**

- Member of Editorial Board, Column editor for the *Computer* Magazine, IEEE Computer Society, Fall 2025 - present
- Associate Member, Applied Signal Processing Systems Technical Committee (ASPS TC), IEEE Signal Processing Society.

**Reviewer**

- **Programs:** NSF: Mid-Scale Research Infrastructure (2024), ENG/ECCS (2024), Graduate Research Fellowships Program (GRFP, 2025)
- **Journals:** IEEE Transactions on [Signal Processing, Quantum Engineering], Reports on Progress in Physics, PRX Quantum, Quantum, Physical Review Letters, Physical Review A, Physical Review R, npj Quantum Information, Quantum Science and Technology, New Journal of Physics, Communications Physics, Journal of Physical Chemistry, Journal of Chemical Theory and Computation, Chemical Physics, IEEE/CAA Journal of Automatica Sinica
- **Conferences:** QCTiP, IEEE QCE, ACM QuNet, ACM SPAA

**Conference Program Committee (PC), Organizer, Chair**

- 2025 Annual Quantum Symposium, Chairman, NC State University, Raleigh NC, May 29-30, 2025.
- IEEE QEC'25, PC member, Technical Paper Track on Quantum Applications, Albuquerque, NM.
- QuNet workshop at the ACM Special Interest Group on Data Communication (SIGCOMM), PC member, Coimbra, Portugal, September 2025.
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA'25), PC member, Portland, OR, July 2025.
- Global Physics Summit (Joint APS March-April Meeting), Organizer, Tutorial of Hybrid Continuous-Discrete Variable Quantum Computation, Anaheim, CA, 2025.
- Session chair at 28th Annual Quantum Information Processing Conference (QIP 2025).
- Organizer, Special session on "Signal Processing and Quantum Computing" at the Information Theory and Application Workshop, University of San Diego, San Diego CA, 2024.
- IEEE QCE'24, PC member, Technical Paper Track on Quantum Applications, Montreal, Québec, Canada.
- Session chair for "Quantum Computing for Tackling Challenges in Quantum Chemistry Symposium", ACS Fall Meeting, San Francisco, August 2023.
- Session chair for the quantum science and engineering center annual research conference (QuARC), Massachusetts Institute of Technology, February 2022.

**PhD/Master Thesis and Exam Committees** – Member, January 2024 - Present
NC State:

- Elaheh Karooby (Qing group, Physics, Ph.D. 2028 expected)
- Vinit Singh (Kais group, ECE, Ph.D. 2026 expected)
- Heba Labib (Kemper group, Physics, Ph.D. 2026 expected)
- Zachary Parks (Dreher Group, ECE, Ph.D. 2025 expected)
- Huayue Gu (Yu Group, CSC, Ph.D. 2025 expected)
- Atulya Mahesh (Mueller group, Computer Engineering, Master awarded in May 2025)
- Amey Meher (Zhou Group, ECE, Master awarded in May 2024)

Non-NC State:

- Mathew Hagan (Nathan Wiebe group, Physics, University of Toronto, Ph.D. awarded in 2025)

**Outreach**

- Outreach lecture at Bexley high school (virtual, Ohio) on quantum science and technology via the Quantum To-Go project of American Physical Society, April 2023.
- Judge (multiple times) for K-12 Science and Engineering Fairs: Massachusetts Science & Engineering Fair, Boston MA, April 2021; Times Squared Academy Science and Engineering Fair, Providence RI, February 2020; Rhode Island Science and Engineering Fair, Community College of Rhode Island, April 2016.

## GRANTS

*Total awarded grants = $15.3 M. Share to my research group = $5.2 M.*

1. *Achieving Quantum Utility with Hybrid Discrete Continuous Variable Quantum Processors*, Department of Energy, Office of Science Scientific Computing Research (ASCR). Lead Principal Investigator (other collaborative institutions: Rutgers University, UMass Amherst, NASA Ames, PNNL, and LBNL). 9/1/2024 - 8/31/2029. Total: $10.6M. Share: $5M.
2. *QACTI: Quantum Advantage-Class Trapped Ion Systems*, sub-award from Duke University, Design phase, project for National Quantum Virtual Laboratory (NVQL), National Science Foundation. 9/1/2025 - 8/31/2026. Total: $100k. Share: $30k.
3. *Quanta-Bind: Demystifying Proteins*, sub-award from qBraid, Inc, Wellcome Leap Foundation, Quantum4Bio program. 2024/1 - 2025/3. Share: $ 60k.
4. *Phase Space Formulation and Simulation of Molecular Conical Intersections*, RQS Seed Funding, University of Maryland (UMD). Principal Investigator, in collaboration with NIST and UMD. 9/1/2024 - 8/31/2025. Total: $80k. Share: $68k.
5. *QACTI: Quantum Advantage-Class Trapped Ion Systems*, sub-award from Duke University, pilot project for National Quantum Virtual Laboratory (NVQL), National Science Foundation. 8/15/2024 - 7/31/2025. Total: $ 100k. Share: $9k.