Kyle Sherbert

CONTACT INFORMATION

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EDUCATION

Ph.D - **Physics**
University of North Texas (Denton, TX) May 2022

MS - **Physics**
University of North Texas (Denton, TX) Dec 2020

MS - **Computer Science**
Towson University (Towson, MD) May 2017

BS *cum laude* - **Physics**; **Molecular Biology, Biochemistry and Bioinformatics**
Towson University (Towson, MD) Aug 2015

RESEARCH EXPERIENCE

Postdoctoral Researcher
Department of Chemistry and Department of Physics, Virginia Tech (Blacksburg, VA)
Mentors: Nick Mayhall, Sophia Economou, Ed Barnes 2022-Present

Virtual Intern
NASA Goddard Space Flight Center (Greenbelt, MD)
Mentor: Harry Shaw 2021-2022

Research Assistant
Department of Physics, University of North Texas (Denton, TX)
Mentor: Marco Buongiorno-Nardelli 2018-2022
Mentor: Paolo Grigolini 2019, Jan-May

Senior Software Developer
Department of Computer and Information Sciences, Towson University (Towson, MD)
Mentors: Siddharth Kaza, Blair Taylor 2017, Aug-Dec

Master's Thesis
Department of Computer and Information Sciences, Towson University (Towson, MD)
Faculty Mentor: Marius Zimand 2016-2017

Graduate Assistant
Department of Computer and Information Sciences, Towson University (Towson, MD)
Mentors: Siddharth Kaza, Blair Taylor 2015-2017

Research Assistant
Department of Physics, Astronomy, and Geosciences, Towson University (Towson, MD)
Mentor: Jia-An Yan 2014-2015

Research Intern
Univeristy at Buffalo, Hauptman-Woodward Medical Research Institute (Buffalo, NY)
Mentors: Andrew Gulick, Geoffrey Lippa 2014, May-Aug

Teaching experience is listed separately.

AWARDS

QCE24 Quantum Machine Learning Track, Best Paper 2024
UNT College of Science Travel Award 2020
Maryland Space Grant Consortium Scholar 2014-2015
Edward L. Rubendall Outstanding Physics Student (TU) 2012-2014

Jess Fisher FCSM Scholar (TU, Full Tuition) 2011-2015
Maryland Distinguished Scholar 2011-2015
Towson University Honors Scholar 2011-2015

PUBLICATIONS

Surrogate constructed scalable ciruits ADAPT-VQE using the Schwinger model.
Erik Gustafson, **KS**, Adrien Florio, Karunya Shirali, Yanzhu Chen, Henry Lamm, Semeon Valgushev, Andreas Weichselbaum, Sophia E Economou, Robert D Pisarski, Norm M Tubman.
arXiv:2408.12641. 2024

Parameterization and optimizability of pulse-level VQEs.
KS, Hisham Amer, Sophia E Economou, Edwin Barnes, Nicholas J Mayhall.
Phys. Rev. Applied **23**, 024036. 2024

Adaptive quantum generative training using an unbounded loss function.
KS, Jim Furches, Karunya Shirali, Sophia E Economou, Carlos Ortiz Marrero.
2024 IEEE International Conference on... (QCE), pp. 1731-1738 2024

Quantum compressive sensing: mathematical machinery, quantum algorithms, and quantum circuitry.
KS, Naveed Naimipour, Haleh Safavi, Harry Shaw, Mojtaba Soltanalian.
Applied Sciences (**12**: 15). 2022

Band theory and beyond: Applications of quantum algorithms for quantum chemistry.
*Dissertation. 2022

Locating excited states without modifying a cost-function.
KS, Marco Buongiorno Nardelli.
arXiv:2204.04361. 2022

Quantum algorithm for electronic band structures with local tight-binding orbitals.
KS, Anooja Jayaraj, Marco Buongiorno Nardelli.
*Scientific Reports (**12**).* 2022

A systematic variational approach to band theory in a quantum computer.
KS, Frank Cerasoli, Marco Buongiorno Nardelli.
RSC Advances (**11**). 2021

Quantum computation of silicon electronic band structure.
Frank T Cerasoli, **KS**, Jagoda Sławińska, Marco Buongiorno Nardelli.
Physical Chemistry Chemical Physics (**22**). 2020

Hello, World!—Code Responsibly.
Siddharth Kaza, Blair Taylor, **KS**.
IEEE Security & Privacy (**16**: 1). 2018

Information reconciliation for erasure channels.
*Master's thesis. 2017

* Available on my personal website, kmsherbert.neocities.org

TEACHING EXPERIENCE

Center for Talented Youth, Johns Hopkins University (Baltimore, MD)

Summer Faculty, CTY Summer Programs

Intensive three-week long course (two sessions per summer) for grades 5-10, comparable to a semester-long college course.

- **Flex instructor:** Responsible for floating between classes of all subjects, delivering guest lessons, supporting fellow instructors in classroom management, and substituting in during emergencies.
- **Instructor:** Fully responsible for curriculum, lesson prep, content delivery, supervising a TA, and providing detailed narrative evaluations to each student.
- **Teaching Assistant:** Responsible for helping the instructor with clerical and instructional tasks, and taking detailed notes to provide evidence for narrative evaluations.

Code	*Course*	*Site*	*Session*
		Flex Instructor	
		Ursinus College	(1) 2024
		Instructor	
SREH	Special Relativity	Johns Hopkins University	(2) 2023
CODE	Cryptology	Roger Williams University	(1) 2023
DATA	Data Structures and Algorithms	Roger Williams University	(1,2) 2022
		Teaching Assistant	
ASTR	Astrophysics	Franklin and Marshall College	(1,2) 2019
FCPS	Fundamentals of Computer Science	Seattle University	(1,2) 2018
CODE	Cryptology	Loyola Marymount University	(1,2) 2017
DATA	Data Structures and Algorithms	Franklin and Marshall College	(2) 2016
ASTR	Astrophysics	Franklin and Marshall College	(1) 2016
GNIC	Genomics	Johns Hopkins University	(2) 2015
IENG	Investigations in Engineering	Johns Hopkins University	(1) 2015

Online Instructor, Programming in Python for Middle-school Students 2020-2022

Asynchronous, self-paced introductory programming course for middle schoolers all over the world.
Responsible for giving detailed feedback to students on programming assignments for each unit, being on call to meet with students in any time zone virtually, providing detailed narrative evaluations to each student, and coordinating with other instructors to improve the curriculum.

Virginia Tech (Blacksburg, VA)

Tutor, VTQ Summer School Aug 2024

Virtual week long course for high-schoolers, with one program-wide lecture delivered at the beginning by the teacher, followed by small-group breakout rooms for the rest of the week.
Responsible for guiding students in one breakout room through a series of exercises, puzzles, and games covering foundational concepts in quantum information, algorithms and communication.

Teacher, BEE-VT Jul 2024

One-day version of the VTQ Summer School, part of a two-week program for black high-schoolers interested in engineering.
Responsible for content delivery, structuring the day's tasks to keep students engaged, and supervising tutors.

Instructor, WDTS-RENEW Aug 2023

Intensive in-person version of the week-long VTQ Summer School at Brookhaven National Lab (Yaphank, NY), part of a six-week program for underprivileged college freshman interested in STEM.
Responsible for adapting curriculum from the VTQ Summer School, supplementing the curriculum with my own lessons, content delivery, and supervising a graduate student assisting as a TA.

University of North Texas (Denton, TX)

Learning Assistant, PHYS 1270 2019-2020

Science and Technology of Muscial Sound: Lecture-based physics elective for non-majors with 100+

students.
Responsible for assisting lecturer with clerical and instructional tasks, printing and grading daily quizzes and quarterly exams, supervising undergraduate assistants responsible for grading homeworks, learning every student's name so they knew they were loved, and adapting the course format to asynchronous online learning when global pandemic struck mid-semester.

Lab Assistant, PHYS 1430 2018-2019
General Physics Laboratory I: Lab component of algebra-based introductory physics for engineering majors.
Responsible for supervising students in lab, orienting students to the equipment each week, grading weekly pre-labs and bisemesterly lab reports, verifying students satisfactorily answered comprehension questions at the end of each lab, and fixing things when they broke.

Archdiocese of Washington (Washington, DC)

Substitute Teacher, Pre-K through 8th grade 2018, Jan-May
On call to fill in for any grade, for any subject, as needed, at Cardinal Hickey Academy (Owings, MD) and St. Mary of the Assumption (Upper Marlboro, MD).
Responsible for content delivery, classroom management, and learning the names of every student in the school so they know to take you seriously. Notable experiences include:

- Serving two weeks as the long-term substitute Spanish teacher at CHA, remembering just enough of my own middle-school Spanish to deliver instructions in Spanish, to the astonishment of the students.
- Serving three days as the middle school science and math teacher at SMA, entrusted to design my own curriculum and lesson prep.
- Spending almost every Friday with Kindergarteners at SMA, and improvising a lesson awakening them to world geography by following the story of Jonah.

Towson University (Towson, MD)

Teaching Assistant, COSC 175, COSC 236 2015-2017
General Computer Science and Introduction to Computer Science I: Introductory programming courses for non-majors and majors.
Responsible for supervising students in lab, proctoring exams, and providing detailed feedback on programming asssignments.

Teaching Assistant, SPLASH 2016, Jan-Dec
Asynchronous for-credit introductory programming course for high-school girls interested in computer science.
Responsible for being on call to meet with students virtually and providing detailed feedback on programming asssignments.

Grader, PHYS 307 2014, Jan-May
Introductory Mathematical Physics: Survey course for physics majors covering various facets of applied mathematics.
Responsible for grading homeworks, tracing mistakes, and providing thorough feedback.

SERVICE

Guest Lecturer

- PHYS 2254: Hello Quantum World!, *Virginia Tech* (Blacksburg, VA)
  Week-long lesson on quantum error correction. Nov 2023
- PHYS 4254: Quantum Information Technologies, *Virginia Tech* (Blacksburg, VA)
  One-day lesson on measurement and eigenstates. Feb 2023

Reviewer

- *Journal of Supercomputing*

Session Chairing

- *IEEE Quantum Week 2024* (Montreal, Canada)
  QML-QOPT1: Quantum optimization Sep 2024
- *APS March Meeting 2024* (Minneapolis, MN)
  Y49: Quantum annealing and quantum-inspired classical algorithms Mar 2024
- *VTQ Symposium* (Blacksburg, VA)
  Morning session Nov 2023

Conference Organization

- *Division of Quantum Information, APS*
  Sorter for APS March Meeting 2024 Nov 2023

Selection Committees

- *Jess and Mildred Fisher College of Science and Mathematics, Towson University* (Towson, MD)
  College scholarship committee, student representative 2015

Musician

- *Blacksburg Community Band* (Blacksburg, VA)
  Clarinetist 2023-Present
- *St. Jude Roman Catholic Church* (Radford, VA)
  Vocalist 2022-Present
- *Denton Community Band* (Denton, TX)
  Clarinetist 2018-2022
- *St. John Paul II Catholic University Parish* (Denton, TX)
  Clarinetist, Vocalist, Cantor 2018-2022
- *Jesus the Good Shepherd Catholic Community* (Owings, MD)
  Clarinetist 2017-2018
- *Towson University Symphonic Band* (Towson, MD)
  Clarinetist 2013-2017
- *Towson University Catholic Campus Ministry* (Towson, MD)
  Clarinetist, Vocalist, Pianist, Cantor, Director 2011-2017

PRESENTATIONS

Invited Talks

The role of reference states in pulse-level VQE
CFNS Workshop (Stonybrook, NY) Feb 2025

Quantum compressive sensing.
NASA QuAIL Seminar (Virtual) Jan 2025

Julianic simulations of a pulse-level VQE.
JuliaCon (Virtual) Jun 2023

Quantum compressive sensing.
VTQ Internal Seminar (Blacksburg, VA) Dec 2022

Band theory on a quantum computer.
ES22 (New York, NY) May 2022

Quantum compressive sensing.
SCaN Breakout Intern Seminar (Virtual) Dec 2021

Exploring natural product formation with structural biology.
Towson MB3 Club Seminar (Towson, MD) Feb 2015

Contributed Talks

The role of reference states in pulse-level VQE
APS Global Summit (Anaheim, CA) Mar 2025

Adaptive quantum generative training using an unbounded loss function.
QCE24 (Montreal, Canada) Sep 2024

An adaptive pulse-level variational quantum eigensolver.
APS March Meeting (Minneapolis, MN) Mar 2024

Implementing translational quantum subspace expansion with fewer qubits.
APS March Meeting (Chicago, IL) Mar 2022

Band structure in a quantum computer.
APS March Meeting (Virtual) Mar 2021

Posters

*__An adaptive pulse-level variational quantum eigensolver.__
VTQ Symposium (Blacksburg, VA) Nov 2023

*__Band theory and beyond.__
UNT MRS Poster Competition (Denton, TX) Mar 2022

*__Information entropy of 1D quantum systems.__
TU Research Expo (Towson, MD) May 2015

*__Surviving abroad without a smartphone.__
TU Honors College Expo (Towson, MD) Mar 2015

*__Exploring natural product formation with structural biology.__
CTRC Summer Research Colloquium (Buffalo, NY) Aug 2014

*__Computational simulation of electron diffraction.__
APS March Meeting (Denver, CO) Mar 2014

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