Christopher Kang

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EDUCATION

University of Washington, Seattle, WA 9/2018-present
Bachelor of Science in Computer Science GPA: 3.95/4.0
Bachelor of Science in Economics
Phi Beta Kappa member

RESEARCH INTERESTS

Full-stack quantum computation, quantum Hamiltonian simulation

RESEARCH EXPERIENCE

Novel Control Schemes for Boson-Qubit Devices *9/2020-present*
Advised by Nathan Wiebe *UToronto, C2QA*
- Used matrix product formulas (Trotter, Baker-Campbell-Hausdorff) to design new control schemes for hybrid boson-qubit quantum devices
- Collaborated with physicists and computer scientists to explore potential near-term applications of hybrid boson-qubit devices
- Publication currently being prepared for submission [1]

Quantum-Inspired Classical Hamiltonian Simulation *6/2020-present*
Advised by Sriram Krishnamoorthy and Karol Kowalski *PNNL*
- Co-led the design/creation of a quantum-inspired algorithm for *ab initio* molecular simulations based on Trotterization/phase estimation
- Presents a new framework to effectively emulate Hamiltonian simulation algorithms with superpolynomially less memory
- Received campus nomination for Goldwater scholarship with this project. This work is also being included as a key deliverable in an upcoming grant review to the Department of Energy
- Publication currently being prepared for submission [2]

Device-Aware Quantum Circuit Compilation *6/2019-9/2019*
Advised by Sriram Krishnamoorthy *PNNL*
- Implemented a software pipeline in Q# to reduce the circuit depth necessary for phase-estimation based Hamiltonian simulation.
- Took Broombridge Hamiltonians as input and produced low-level circuits that used fermionic swaps to minimize depth on non-all-to-all devices.

Reinforcement Learning *1/2019-9/2019*
Advised by Willie Agnew and Pedro Domingos *UW*
Supported grad student with evaluating models in different environments.

Graph-Based Semi-Supervised Learning *6/2018-9/2018*
Advised by Mahantesh Halappanavar *PNNL*
Investigated the use of graph-based semi-supervised neural networks to classify the severity of computer vulnerabilities.

RESEARCH READING

Communication Complexity Reading *3/2021-present*
Advised by Paul Beame *UW*
Independent study in communication complexity, like the pseudorandomness of the index function, as an exploration of classical theoretical computer science

PUBLICATIONS & PREPRINTS

[1] Implementing Exponentials of Block-Encoded Bosonic Operators
Christopher Kang, Nathan Wiebe (preprint, 2021).

[2] Optimized Quantum Phase Estimation for Large Ab Initio Simulations
Christopher Kang, Nicholas Bauman, Sriram Krishnamoorthy, Karol Kowalski (preprint, 2021).

RECOGNITION	**Hellmut Golde Endowed Scholarship**, UW CSE	*9/2021*
	Awarded to a student in Computer Science based on academic merit ($1750)	
	George and Pearl Corkery Scholarship, UW Economics	*5/2021*
	Awarded to an exceptional junior in Economics based on academic merit ($2500)	
	Campus Nomination for Goldwater Scholarship, UW	*12/2020*
	Campus nomination for the national Goldwater scholarship	
	Microsoft Endowed Scholarship, UW CSE	*9/2019*
	Awarded to a student in Computer Science based on academic merit ($500)	
	Honors Calculus Award, UW Department of Mathematics	*6/2019*
	Top student in the 1st year Honors Calculus Class ($200)	
	Honors Undergraduate Scholars Award, UW Honors Program	*9/2018*
	Awarded a four-year merit-based tuition waiver ($47000)	

TALKS	**Quantum-Inspired Classical Hamiltonian Simulation**	*9/2020*
	Northwest Quantum Nexus / UW Workshop	
	Building a Variational Quantum Eigensolver in Q#	*3/2019*
	Northwest Quantum Nexus	

TEACHING	**TA: Graduate Quantum Computing**, UW CSE	*Winter 2022*
	Forthcoming	
	TA: Undergraduate Quantum Computing, UW CSE	*Fall 2020*
	Taught a special topics class on quantum computing and quantum algorithms. Wrote and presented three lectures on Hamiltonian simulation. Received highest TA rating from faculty instructor, *"Truly Exceptional"*	
	TA: Freshman Introductory Seminar, UW CSE	*Summer, Fall 2019*
	Taught an introductory class for freshmen on inclusive leadership	

SERVICE	**Special Assistant for Undergraduate Research**, UW CSE	*9/2021-present*
	Year-long appointment to improve the undergraduate research experience	
	Member, ACM's US Tech Policy Council (USTPC)	*2/2021-present*
	Principal author for USTPC's Statement on Remote Test Administration	
	Board Member, Q++ (LGBTQ+ @ UW CSE)	*9/2018-present*
	Built an LGBTQ+ community in UW CSE and supported LGBTQ+ peers	
	Co-Chair, CSE Student Advisory Council	*Spring 2019-Summer 2021*
	Served as head undergraduate representative to faculty and staff in the department	
	Representative, CSE Student Advisory Council	*Fall 2018-Spring 2019*
	Represented undergraduates in the CSE School	

WORK EXPERIENCE	**Summer Scholar**, Deloitte Consulting, LLP	*Summer 2021*
	Supported a large public sector healthcare client with an enterprise-level digital transformation effort	
	Outreach Ambassador, UW CSE	*Winter 2019-Fall 2020*
	Supported CSE outreach efforts to diverse K-12 students across the Puget Sound	
	Student Assistant, UW CSE	*Fall 2018-Fall 2020*
	Assistant to Director of External Outreach	