

JAMES SUD

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EDUCATION

University of Chicago **Oct 2022-present**

Ph.D candidate in Computer Science. Advisor: Dr. Fred Chong. Focus in quantum computing.

University of California, Berkeley **Aug 2016 – May 2020**

B.S. in Physics, Minor in Computer Science, GPA: 3.9. High Distinction

RESEARCH EXPERIENCE

Student Researcher **Aug 2022-present**

Computer Science Department, Physical Sciences Division, University of Chicago

- Investigating approximations to the Quantum Approximate Optimization Algorithm (QAOA)
- Exploring parameter setting strategies for QAOA instances drawn from wireless networks
- Determining performance of QAOA on Hamming symmetric cost functions

Research Assistant **Oct 2020-Aug 2022**

Universities Space Research Association, NASA Academic Mission Services

- Deriving the effects of various error channels on the expectation values of quantum and classical Hamiltonians, implementing methods to simulate these noisy expectation values.
- Numerically/analytically exploring entanglement and in QAOA
- Numerically/analytically investigating parameter setting strategies and behavior of QAOA for combinatorial optimization problems under restricted parameter schedules

Feynman Quantum Academy Intern **May 2020 – June 2020 / Aug 2020 – Oct 2020**

Universities Space Research Association, NASA Academic Mission Services

- Programmed and benchmarked a novel approach using QAOA for graph coloring into Rigetti's PyQuil Framework.
- Implemented error mitigation strategies in collaboration with Rigetti's hardware team.
- Developed compilation scheme to reduce the number of SWAPS required on a linear lattice of qubits for graph coloring QAOA.

Quantum Computing Summer School Fellow**June 2020 – Aug 2020**

Los Alamos National Laboratory, Quantum Computing Summer School

- Programmed and tested an algorithm for simulating small molecules on a quantum computer using a shot-frugal variational quantum/classical algorithm as well as a novel approach for reducing the depth of the Variational Quantum Eigensolver algorithm
- Co-led writing and published latter of the above projects in PRX Quantum journal
- Participated in and attended lectures on frontiers in near-term quantum algorithms

Quantum Programmer, Lawrence Berkeley National Laboratory (unpaid) Dec 2019 – June 2020

- Programmed and tested a lab-developed algorithm for high energy physics simulations in Google's quantum computing framework Cirq. Work currently being extended to publication.

Project Group Leader, Quantum Computing @ Berkeley Club (unpaid) Sept 2019 – May 2020

- Led a project to numerically test if the Quantum Approximate Optimization Algorithm for Max-Cut can reveal properties of the underlying graph it is called on.
- Designed, presented, a published work on a quantum annealing algorithm for assigning students to dorms to maximize social distancing in light of the COVID-19 pandemic.
- Attended and presented theoretical papers in quantum computing weekly

Research Affiliate, Lawrence Berkeley National Laboratory (unpaid) Aug 2017 – Aug 2018

- Researched and organized data on the economic viability of various renewable energies in China, helped compile reports on mitigation of greenhouse gases for the China Energy Group

PUBLICATIONS/PREPRINTS

1. **Sud, James**, Tkachenko, Nikolay V., et al. "Correlation-Informed Permutation of Qubits for Reducing Ansatz Depth in the Variational Quantum Eigensolver." *PRX Quantum*, vol. 2, no. 2, 2021, doi:10.1103/prxquantum.2.020337.
2. **Sud, James** et al. "Dual Map Framework for Noise Characterization of Quantum Computers." *Physical Review Applied*, vol. 106, iss. 1, 2022, doi: 10.1103/PhysRevA.106.012606.
3. Alam, M. Sohaib, et al. "Practical Verification of Quantum Properties in Quantum Approximate Optimization Runs." *Physical Review Applied*, vol. 17, iss. 2, 2022, doi: 10.1103/PhysRevApplied.17.024026.
4. **Sud, James** and Li, Victor. "A Quantum Annealing Approach to Reduce Covid-19 Spread on College Campuses." 1 Dec 2022, arxiv:2112.01220 [quant-ph]
5. Deliyannis, Plato et al. "Improving Quantum Simulation Efficiency of Final State Radiation with Dynamic Quantum Circuits." Accepted 28 June 2022, *Physical Review D*
6. **Sud, James** et al. "A Classical Parameter Setting Heuristic for the Quantum Approximate Optimization Algorithm." 22 Nov 2022. arxiv:2211.09270 [quant-ph]
7. Shen, Yizhi, et al. "Theory of Real Time Krylov Subspace Diagonalization for Quantum Computing Algorithms." 1 Aug 2022. arxiv:2208.01063 [quant-ph]

CONFERENCE TALKS

1. Contributing Author: Venturelli, Davide, et al. "Quantum Optimization Experiments with Advanced Mixers and Controls." *Bulletin of the American Physical Society*, American Physical Society, 17 Mar. 2021.
2. Contributing Author: Shen, Yizhi, et al. "Theory of Real Time Krylov Subspace Diagonalization for Quantum Computing Algorithms." *Bulletin of the American Physical Society*, American Physical Society, 14 Mar. 2022.
3. Contributing Author: Venturelli, Davide, et al. "Hardware-Efficient Quantum Optimization Layered Algorithms and Experiments." *Bulletin of the American Physical Society*, American Physical Society, 15 Mar. 2022.

NON-RESEARCH EMPLOYMENT HISTORY

Academic Center Assistant, UC Berkeley **June 2017 – May 2020**

- Maintained study environment, communicated with students to resolve their academic needs.

AWARDS

National Science Foundation Graduate Research Fellowship Program (Accepted) **Apr 2022**

Three years of funding for Ph.D. research in quantum algorithms for optimization problems.

NASA Space Technology Graduate Research Opportunities (Declined) **Apr 2022**

Five years of funding for Ph.D. research in quantum algorithms for optimization problems.

Quantum Computing Summer School Fellowship **June 2020 – Aug 2020**

Los Alamos National Laboratory. 1/18 selected internationally.

Olsen Memorial Fund and Jackson Award **Fall 2018 / 2019**

UC Berkeley Physics Department. Based on academic standing and progress in the physics major

EXTRACURRICULARS

Musician and Producer, Deixis **Jan 2023 – present**

- Wrote performed and produced opening theme song for [The Deixis Podcast](#)

Quantum Researcher, Indigo Sound **Sept 2020 - present**

- Developed a proof-of-concept audio sampling tool using quantum machine learning. Performed computations on classical simulators and quantum hardware. Sold a demonstrative [NFT](#).

Co-Leader and Bassist, [MintJulep](#) and [Sunnydew](#)**Aug 2017 – Jan 2023**

- Helped record, produce, and distribute 6-track EP “Sonic Medicine” for 4-piece Jazz/Neo-Soul band MintJulep, streamed over 50k times. Performed at over 15 venues in the Bay Area.
- Wrote, arranged, recorded, produced, and engineered 12-track LP “Komorebi Album 1,” released on all platforms with all proceeds to Black Lives Matter and COVID-19 relief.

Co-Founder and Co-Owner, [Nebular Rides](#)**Aug 2008 - June 2015**

- Designed, built, painted, marketed, and sold skateboards, shirts, and watercrafts in San Diego.