

EDWARD KIM

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EDUCATION

The University of North Carolina at Chapel Hill

2019 -

Ph.D Candidate, Computer Science

The University of California at Berkeley

2013 - 2017

B.A in Computer Science

Honors B.A in Pure Mathematics

RESEARCH INTERESTS

Quantum Computation Theory:

Quantum Error Correction

Quantum Information Theory

Topological Quantum Computation

Computational Complexity Theory:

Quantum Complexity Theory

Geometric Complexity Theory

PUBLICATIONS

- **Edward Kim**, Parasara Sridhar Duggirala: Kaa: A Python Implementation of Reachable Set Computation Using Bernstein Polynomials, 7th Int. Workshop on Applied Verification for Continuous and Hybrid Systems, 2020

EXPOSITIONS

- **Notes on the Fourier Analysis of Boolean Functions**

Wrote an short survey on the Fourier Analysis of Boolean Functions with view towards the Linial-Mansour-Nisan Theorem. [Link to Report](#)

- **Quantum Expanders and k -designs**

Wrote an expository paper on the theory of Quantum Pseudorandomness as a project for Advanced Topics in Quantum Information. [Link to Report](#)

- **Schur-Weyl Duality in Quantum Information**

Wrote an expository paper on applications of the Schur-Weyl Duality to fundamental questions in Quantum Information Theory. Presented it to the Duke University PHYS 590 class of Spring 2020. [Link to Report](#)

RELEVANT COURSE WORK

Mathematics:

Recursion Theory, Model Theory, Lie Groups, Smooth Manifolds, Measure Theory, Functional Analysis, Differential Geometry, Lie Algebras and their Representations, Homological Algebra, Algebraic Topology, Mathematical Logic, Numerical Analysis, Complex Analysis

Computer Science:

Quantum Algorithms and Computation, Computational Complexity Theory, Automata Theory and Computability, Algorithms in Computational Biology, Topological Data Analysis, Boolean Function Complexity, Quantum Information Theory, Randomized Algorithms

SOFTWARE

- **Kaa (> 5000 lines)** - Software created to experiment with reachable set computations of non-linear systems governed under discrete polynomial dynamics. It was specifically created to understand the effectiveness of dynamically-reorienting parallelotope bundles. It is the first experimental software created to properly plot the evolution and changing of these dynamic bundle strategies.

WORK EXPERIENCE

University of North Carolina at Chapel Hill

2019 -

Research Assistant- Providing research assistance to projects pertaining to the formal verification of safety properties of non-linear cyber-physical systems. Focusing on counter-example generation to aid practitioners in verifying the safety of their models. Supervised by Parasara Sridhar Duggirala.

- Created a tool called Kaa for the reachability of non-linear discrete dynamical systems using parallelotope bundles.
- Contributed to the documentation efforts of HyLAA, a verification tool of hybrid automata governed by linear dynamics.

University of South Carolina

2016

Research Assistant- Published some basic results about fundamental inequalities by remotely collaborating with Professor Wei-Kai Lai from the University of South Carolina, Salkehatchie.

Paper: Some inequalities involving geometric and harmonic means

PEDAGOGY

Calculus Tutor

2018

Tutored Calculus to students at South Carolina State University. Stressed geometric intuition and visual approaches rather than rote memorization of formulae and concepts.

Programming Languages Tutor

2018

Provided discussions for South Carolina State University Computer Science students attending summer courses. Discussions pertained to Python, Java, and C.

WORKSHOPS/CONFERENCES ATTENDED

Simons Institute for the Theory of Computation

2020

Spring 2020 Workshop on Quantum Protocols: Testing & Quantum PCPs

[Link to Workshop Description](#)