

# **Varun Kannan**

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Website: <https://www.qgspinor.com>

## **Education**

2018-09 - 2022-06: Bachelor of Science: Physics, Minor in Mathematics

University of California - San Diego - La Jolla, CA

GPA: 3.32 | 3.60 Major

Honors: Provost Honors (5 terms), Salutatorian (HS)

## **Research Interests**

Quantum Gravity | Quantum Field Theory | General Relativity | Quantum Information | Quantum Technology

## **Technical Skills**

Programming Languages: Python, Java, Mathematica, C#, JavaScript, HTML

Programming related frameworks: Pandas, NumPy, Matplotlib/Plotly, VectorBt, OOP, Multiprocessing

Programming related platforms: Linux, WSL, PowerShell, Jupyter Lab, PyCharm, Android Studio

available upon request

## **Research Experience**

### **Quantum Physics Research**

**Internship (Paid):** 06/2021 - 09/2021 (3 months) UCSD Physics Department, La Jolla, CA

Dr. Daniel Green, Associate Professor at UCSD

- Identified issues in existing models of quantum fields and tested proposed models on existing data with rigorous analysis tools and a comprehensive research process. Use of Bayesian filters to estimate hidden variables in the context of quantum phenomena, such as decoherence.
- Use of Axiomatic QFT and statistical learning principles to ensure both theoretical and modeling consistency
- Analyzed research data from various technical sources using Mathematica to create representative graphs and summaries highlighting key insights.

**Honors Research:** 09/2021 - 12/2021 (3 months)

- Continued the previous internship as an official research subproject with the goal of aiding Dr. Green in his research and learning under his mentorship

**Independent Study/Research** 03/2021 - 12/2021 (9 months) UCSD Physics Department, La Jolla, CA

Dr. George Fuller, Distinguished Professor, Former Director of the Center for Astrophysics and Space Science, UCSD

- A mentorship and research on various topics in the field of General Relativity, including the formulation of alternate descriptions of gravity as a geometrical theory. Obtained testable predictions and attempted to compare to existing data.
- Studied extensions to the torsion free theory, including the use of the spin connection, and the use of a proposed operator theoretic construction of the related geometric quantities.

## **Publications and Technical Writing**

- Authored a paper based on individual study along with a review from Dr. Jeffrey Rabin (UCSD) on the application of the geometric interpretation of gauge theories to formulating models in quantum gravity [https://qgspinor.com/writings\\_learnings/writings](https://qgspinor.com/writings_learnings/writings)
- Created the website, <https://www.qgspinor.com>, where I post technical writing, short review articles, derivations, and related exploratory topics.

## **Awards**

- Provost Honors: Fall 2019, Fall 2020- Spring 2021, Spring 2022
- Completion of a quarter of Honors Research under Dr. Daniel Green

## **References**

References available upon request