

Education

- **University of Kansas** **Lawrence, KS**
Ph.D. Physics 2021 – Present
 - Ph.D. candidate working in the HEP theory group. Advisors: KC Kong, Ian Lewis.
- **University of Connecticut** **Storrs, CT**
B.S. Physics 2012 – 2016
 - Graduated with honors and completed an honors thesis titled [Monte Carlo Applications and Lattice QCD](#).

Research Interests

- Beyond Standard Model physics (such as model building and gauge theories, matter-antimatter asymmetry), collider physics, and machine learning and quantum algorithms used therein.

Published Papers

- [1] P. Shyamsundar, J. L. Scott, S. Mrenna, K. T. Matchev, and K. Kong, “Variance reduction via simultaneous importance sampling and control variates techniques using vegas,” *SciPost Phys. Codebases*, p. 28, 2024, doi: [10.21468/SciPostPhysCodeb.28](https://doi.org/10.21468/SciPostPhysCodeb.28).
- [2] I. M. Lewis, J. L. Scott, M. A. Soto Alcaraz, and M. Sullivan, “Real singlet scalar benchmarks in the multi-TeV resonance regime,” *Phys. Rev. D*, vol. 112, no. 9, p. 95024, Nov. 2025, doi: [10.1103/n5rt-jvg3](https://doi.org/10.1103/n5rt-jvg3).

Ongoing Projects

- **Hybrid quantum-classical approach for combinatorial problems at hadron colliders** [\[ARXIV\]](#)
Collaborators: *Zhongtian Dong, Kyoungchul Kong, Taejoon Kim, Myeonghun Park*
 - *Submitted to Communications Physics*. Exploring the use of quantum algorithms that use parameterized circuits to solve the combinatorial problem of $2 \rightarrow n$ collisions. Currently analyzing the use of Quantum Approximation Optimization Algorithm (QAOA) and various derivatives of it and Feedback-based Algorithm for Quantum Optimization (FALCON).
- **Baryogenesis via Spontaneous Flavor Violation**
Collaborators: *Vivan Bhatt, Gaurab Sedhain, Ian Lewis*
 - Exploring the phenomenology of two-Higgs-doublet models (2HDMs) to produce an electroweak phase transition (EWPT) via spontaneous flavor violation to account for the baryon asymmetry of the universe.

Teaching Experience

- TA (University of Kansas): *PHSX 236* – Physics II Lab Spring 2022
Fall 2022
- TA (University of Kansas): *PHSX 801* – Quantum Algorithms Spring 2024
Spring 2025
- TA (University of Kansas): *PHSX 211* – Physics I Fall 2025
- TA (University of Kansas): *PHSX 616* – Physical Measurements Spring 2026

Talks

- *Exploring Quantum Algorithms for Combinatorial Problems at Colliders* **KU PALOOZA**
March 2023
- *Monte Carlo Variance Reduction One Control Variate at a Time* **Phenomenology Symposium**
May 2023
- *Variational Quantum Algorithms for Combinatorial Problems at Colliders* **Particle Physics on the Plains**
October 2023
- *Resolving Combinatorial Problems with Quantum Algorithms* **DPF-Pheno**
May 2024
- *Di-Higgs rate and trilinear coupling benchmarks of the real singlet scalar extension* **SUSY 2026**
May 2026

Organizations & Services

- **Graduate Student Organization (GSO) Executive** Spring 2023, Fall 2023
 - Acted as support and a liaison for students with complaints and concerns about the department.
 - Planned events and get-togethers for graduate students.
- **PALOOZA Organizer** Spring 2023, 2024, 2025
 - Organized all-day event in which physics (along with other departments such as chemistry and geology) students (both graduate and undergraduate) could give a talk or poster presentation on their current research.

Summer Schools

- *Software-Tailored Architectures for Quantum Codesign (STAQ)* **Duke University, NC**
June 2023
- *U.S. Quantum Information Science Summer School (USQIS)* **Fermilab, IL**
August 2023

Work Experience

- **SLAC National Accelerator Laboratory**

LCLS Data Systems Intern

Menlo Park, CA

June 2016 – June 2017

- Built a web-based GUI job control service for automatically processing batch runs.
- Created a service to manage and test the python environment used at the LCLS allowing for automatic nightly builds.
- Analyzed possible noise-reducing peak-finding algorithms compared to those currently used.
- Created a method for offsite installation and download of the complete conda-based python environment along with experiment data.

- **SLAC National Accelerator Laboratory**

Summer Intern

Menlo Park, CA

June 2015 – August 2015

- Created and analyzed simulations of incident photons on a pixel detector using Monte Carlo to improve simulations.