

# CORBIN J. ALLISON

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## EDUCATION

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**Kansas State University**, Manhattan, KS

May 2024

Bachelor of Science in Physics

Minors in Mathematics and Computer Science

- University Honors Program - Thesis: Avoiding pseudo-resonances in theoretically obtained attosecond-controlled photoionization asymmetries in methyloxirane
- Cumulative GPA: 3.845/4.000, Physics GPA: 4.000/4.000

## RESEARCH EXPERIENCE

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**James R. Macdonald Laboratory**, Manhattan, KS

May 2023 - January 2024

Undergraduate Research Assistant | Advisor: Dr. Vinod Kumarappan

- Experimental study of chiral molecules with the reconstruction of attosecond beating by interference of two-photon transitions (RABBITT) experimental technique
- Use of LabVIEW for data acquisition and parallel processing, camera interfacing with BitFlow
- Understanding of high vacuum techniques and particle detection with velocity map imaging (VMI) and microchannel plates (MCP)

**Kansas State University Department of Physics**, Manhattan, KS

May 2023 - August 2023

REU Participant | Advisor: Dr. Loren Greenman

- Sensitivity analysis of ionization asymmetries obtained from time-dependent perturbation theory with respect to Hartree-Fock calculations, basis for Bachelor's thesis (in preparation)
- Use of Molpro quantum chemistry software for Hartree-Fock calculations, ePolyScat package for computing molecular photoionization
- Use of high performance computing on the Beocat Research Cluster at Kansas State University and Perlmutter at the National Energy Research Scientific Computing Center (NERSC)

**Kansas State University Department of Physics**, Manhattan, KS

June 2022 - August 2024

Undergraduate Research Assistant | Advisor: Dr. Loren Greenman

- Theoretical study of ionization asymmetries in chiral molecules using time-dependent perturbation theory, control using the RABBITT experimental technique
- Internationally collaborative with groups at ETH Zürich and Freie Universität Berlin, opportunity to attend and present at the 2023 Gordon Research Conference on Quantum Control of Light and Matter
- Use of high performance computing resources from Beocat and NERSC, programming using Fortran 90, Bash, and Python

## TEACHING EXPERIENCE

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**General Physics 1**

August 2024 - Present

Kansas State University | Primary instructors: Dr. Michael Dubson & Dr. Colin West

- One semester as graduate teaching assistant: introduced recitation activities to students, graded homework assignments, and held office hours to assist students with course materials

**Descriptive Physics**

January 2022 - May 2023

Kansas State University | Primary instructors: Dr. Barbara Fennel & Dr. Bret Flanders

- Two semesters as undergraduate teaching assistant: introduced lab activities to students, graded lab reports, and held office hours to assist students with course materials
- One semester as coordinator: set up and tore down lab activities, led meetings to introduce lab activities to other teaching assistants

**Concepts of Physics**

August 2021 - December 2022

Kansas State University | Primary instructor: Dr. JT Laverty

- Two semesters as undergraduate teaching assistant and coordinator
- Guided students through lab activities, graded lab reports and exams, set up and tore down lab activities

## PRESENTATIONS

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Physics Undergraduate Research Colloquium, Kansas State University, October 2023. Corbin Allison. “Control of Ionization Asymmetries in Chiral Molecules with Attosecond Techniques.”

GRC/GRS Quantum Control of Light and Matter, Newport, RI, August 2023. C. Allison, R.E. Goetz, A. Blech, C.P. Koch, and L. Greenman. “Control of Photoelectron Circular Dichroism with RABBITT” (poster).

NSF REU at K-State: Interactions of Matter, Light and Learning, Kansas State University, August 2023. Corbin Allison. “Calculation of Ionization Asymmetries in Chiral Molecules.”

## PUBLICATIONS

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Goetz, R. E., Blech, A., Allison, C., Koch, C. P., & Greenman, L. (2023). Continuum-electron interferometry for enhancement of photoelectron circular dichroism and measurement of bound, free, and mixed contributions to chiral response. arXiv. <https://doi.org/10.48550/ARXIV.2104.07522> (Submitted to PRL)

Meng Han, Jia-Bao Ji, Alexander Blech, Corbin Allison, Chung Sum Leung, et al. Attosecond Coincidence Spectroscopy of Chiral Molecules, Science (In preparation)

## AWARDS AND HONORS

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University Honors Program Completion Grant	October 2023
James R. Macdonald Memorial Scholarship	August 2023 - May 2024
K-State Dependent/Spouse Grant	August 2023 - May 2024
Semester Honors	May 2023
Cardwell Fund	August 2022 - May 2023
Basil & Mary Curnutte Scholarship	August 2022 - May 2023
Semester Honors	December 2022
Semester Honors	May 2022
Leo E. Hudiburg Scholarship	August 2021 - May 2022
K-State Dependent/Spouse Grant	August 2017 - May 2018
Foundation Plus Scholarship	August 2017 - May 2018

## LANGUAGES AND SKILLS

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**Languages:** English (native), Spanish (A2)

**Programming languages:** Python, Fortran, C/C++/C#, Java, Bash, L<sup>A</sup>T<sub>E</sub>X

**Software:** LabVIEW, Molden, Git, MATLAB, Mathematica, Vim, Jupyter, Docker

## PROGRAMMING PROJECTS

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**Image compression and deblurring with SVD, MATLAB**

- Implementation of algorithms to compress and deblur images using singular value decomposition and low-rank approximation
- Application to grayscale and color images (RGB and YCbCr) to compare with JPEG compression

**The Labyrinth, Java & XML**

- Java based video game for Android devices
- Demonstrated object-oriented programming, data structuring using HashMaps, and file I/O with objects
- Learned GUI programming for Android devices using XML and Android Studio

## RELEVANT COURSEWORK

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### Physics Courses:

• PHYS 694 - Particle Physics	Spring 2024
• PHYS 506 - Advanced Physics Laboratory	Spring 2024
• PHYS 870 - Introduction to Atomic, Molecular, and Optical Physics*†	Fall 2023
• PHYS 709 - Applied Quantum Mechanics	Fall 2023
• PHYS 497 - Senior Research in Physics	Fall 2023
• PHYS 662 - Introduction to Quantum Mechanics	Spring 2023
• PHYS 636 - Physical Measurements Instrumentation	Spring 2023
• PHYS 633 - Electromagnetic Fields II	Spring 2023
• PHYS 664 - Thermodynamics and Statistical Physics	Fall 2022
• PHYS 532 - Electromagnetic Fields I	Fall 2022
• PHYS 325 - Physics III, Relativity, and Quantum Physics	Fall 2022
• PHYS 522 - Mechanics	Spring 2022
• PHYS 214 - Engineering Physics II	Fall 2021
• PHYS 213 - Engineering Physics I	Spring 2021

### Mathematics Courses:

• MATH 716 - Applied Mathematics II*‡	Spring 2024
• MATH 511 - Introduction to Algebraic Systems	Spring 2024
• MATH 715 - Applied Mathematics I*	Fall 2023
• MATH 515 - Introduction to Linear Algebra	Spring 2023
• MATH 221 - Analytic Geometry and Calculus II	Spring 2020
• MATH 340 - Elementary Differential Equations	Summer 2020
• MATH 222 - Analytic Geometry and Calculus III	Spring 2019
• MATH 220 - Analytic Geometry and Calculus I	Fall 2017

### Computer Science Courses:

• CIS 301 - Logical Foundations of Programming	Spring 2024
• CIS 300 - Data and Program Structures	Fall 2022
• CIS 115 - Introduction to Computing Science	Summer 2022
• CIS 200 - Programming Fundamentals	Spring 2022
• ECE 241 - Introduction to Computer Engineering	Fall 2020

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\*Graduate course

†Listed as PHYS 707 on transcript

‡Course audit