

CORBIN J. ALLISON

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EDUCATION

Kansas State University, Manhattan, KS

Expected: May 2024

Bachelor of Science in Physics

Minors in Mathematics and Computer Science

- University Honors Program
- Cumulative GPA: 3.808/4.000, Physics GPA: 4.000/4.000
- Thesis: Sensitivity of Ionization Asymmetries in Chiral Molecules to Molecular Quantum State

RESEARCH EXPERIENCE

James R. Macdonald Laboratory, Manhattan, KS

May 2023 - Present

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 - Present

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

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

ADDITIONAL WORK EXPERIENCE

Heartland Electric, Inc., Fort Riley, KS

May 2015 - August 2022

Electrician

- Industrial, commercial, and residential electrical installation, troubleshooting, and repair
- Independent work on control systems, including SCADA, variable frequency drives, and motor control systems

PRESENTATIONS

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

Continuum-electron interferometry for enhancement of photoelectron circular dichroism and measurement of bound, free, and mixed contributions to chiral response, R.E. Goetz, A. Blech, C. Allison, C.P. Koch, and L. Greenman, submitted, (2023)

AWARDS

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
Cardwell Fund	August 2022 - May 2023
Basil & Mary Curnutte Scholarship	August 2022 - May 2023
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

Languages: English (native), Spanish (A2)

Programming languages: Python, Fortran, C/C++/C#, Java, Bash, L^AT_EX

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

PROGRAMMING PROJECTS

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 about GUI programming for Android devices using XML

RELEVANT COURSEWORK

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 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

*Graduate course