

DEREK BERGNER

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User affiliate at the Advanced Light Source (ALS), Lawrence Berkeley National Lab 2021-2023

EDUCATION

California State University of Long Beach

M.S. in Physics

June 2023

Thesis: "Probing the Electronic Band Structure of Layered Ferromagnets using Angle Resolved Photoemission Spectroscopy (ARPES)"

California State University of Long Beach

B.S. in Physics

December 2020

Santiago Canyon College

Area of Concentration: Physics, Mathematics, Computer Science

May 2017

AWARDS

Richard D Green Fellowship – 2 fellowships awarded in the College of Natural Sciences and Mathematics	May 2019 – May 2020
Graduate RSCA Award – Few fellowships awarded university-wide	Sept 2020 – Sept 2021
Graduate Travel Fellowship – Few fellowships awarded university-wide	Oct 2021
Graduate Student Honors Award – 2 fellowships awarded in the College of Natural Sciences and Mathematics	May 2022

TALKS

American Physics Society Far West Meeting – Oral Presentation, Online "Probing the Electronic Band Structure of Vanadium Triiodide using Angled Resolved Photo Emission Spectroscopy"	October 2021
American Physics Society March Meeting – Oral Presentation, Chicago, IL "Using Angle Resolved Photoemission Spectroscopy ARPES to unveil the Band Structure of the air stable layered ferromagnet $\text{Cr}_x\text{Pt}_{x-1}\text{Te}_2$ "	March 2022
High Energy X-ray Technique (HEXT) Workshop – Poster Presentation, Cornell, NY "An ARPES Study of the Air-Stable Layered Ferromagnets $\text{Cr}_x\text{Pt}_{1-x}\text{Te}_2$ "	May 2022
CNSM Research Symposium – Poster Presentation, Long Beach, CA "Analysis of the Layered Ferromagnet $\text{Cr}_x\text{Pt}_{1-x}\text{Te}_2$ through Angle Resolved Photoemission Spectroscopy (ARPES)"	September 2022
American Physics Society March Meeting – Oral Presentation, Las Vegas, NV An Investigation of Magnetic Alloys of PtTe_2 and PdTe_2 Band Structures using Angle Resolved Photoemission Spectroscopy (ARPES)	March 2023

RESEARCH EXPERIENCE

- Nanoelectronics group CSULB
 - Angle Resolved Photoemission Spectroscopy (ARPES). Independently performed ARPES experiments at the beamline 4.0.3 of the ALS. Experiments include sample mounting and preparation, use of high vacuum chambers, data acquisition, temperature and light beam control, and experiment time management.
 - Data analysis. Experienced at the analysis of ARPES data using multiple routines written on Igor, including a method to calculate the 2nd Derivative of data to unveil band structure dispersions, Dichroism, photon energy dependence analysis, energy/momentum distribution curves, etc. Reported results of ARPES experiments in a peer reviewed journal (Applied Physics Letters) and 3 preprints to be submitted to Applied Physics Letters, Physical Review B and ACS Nano.
 - Photolithography. Perfected methodology to print align markers on Si Wafers for e-beam lithography as well as the printing of electrodes on graphene samples, pushing the resolution limit of a mask aligner

- Sample fabrication. Fabricated van der Waals heterostructure devices for measurements in a closed cycle cryostat
- Experiment setup. Constructed Chemical Vapor Deposition (CVD) furnace system for monolayer graphene growth and temperature annealing of van der Waals heterostructures
- Scientific writing. Contributed to the writing of different articles reporting ARPES results.

TEACHING EXPERIENCE

California State University of Long Beach

Teaching Assistant – to Professor Dr. Claudia Ojeda-Aristizabal in “Advanced Nanoscale Physics” **2021**
Prepared samples for experiments, Managed equipment needed for class such as a mask aligner for photolithography, guided students through experiments

California State University of Long Beach

Grading Assistant – to Professor Dr. Claudia Ojeda-Aristizabal in “Quantum Mechanics I” **2021**
Created solutions for homework sets, graded all written work, gave instructor meaningful feedback

California State University of Long Beach

Instructor – for Physics 100A Lab Course, Astronomy 100 Lab **2019-2021**
Administered weekly labs, graded all written work including finals, Administered all grades

Santiago Canyon College

Supplemental Instructor – for Physics 250A, 250B **2016-2017**
Created problem supplemental problem sets, held weekly meetings for students, collaborated with professors to maximize student learning

SKILLS:

- Programming: Mathematica, Igor Pro, LabView
- Angle Resolved Photoemission ARPES, Advanced Light Source 4.0.3 MERLIN
- Photolithography with a Mask Aligner
- Thin Film Deposition with an Electron Beam Evaporator
- Scanning Electron Microscope
- Atomic Force Microscope
- Assembly of heterostructures using a custom-made Transfer Station
- Chemical Vapor Deposition for the growth of atomically thin materials
- Plasma Etching

PUBLICATIONS AND PAPERS

- Derek Bergner, Claudia Fatuzzo, Daniel Eilbott, Ping Ai, Ryan Reno, Samuel Ciocys, Conrad Stansbury, Prosper Dzanwa, Nicholas Dale, Everardo Molina, Alessandra Lanzara and Claudia Ojeda-Aristizabal “Polarization Dependent Photemission as a Probe of the Magnetic Ground State in the Layered Ferromagnet VI3” Appl. Phys. Lett. 121, 183104 (2022)
- Derek Bergner, Ivan Pelayo, Archibald Williams, Ziling Deng, Warren L. Huey, Luca Moerschini, Jonathan Denlinger, Wolfgang Windl, Alessandra Lanzara, Joshua Goldberger, and Claudia Ojeda-Aristizabal, “Stability of a Type-II Dirac cone in the Van der Waals Ferromagnet $\text{Cr}_x\text{Pt}_{1-x}\text{Te}_2$ ” (In Preparation)

- Ivan Pelayo, [Derek Bergner](#), Archibald Williams, Ziling Deng, Warren L. Huey, Luca Moreschini, Jonathan Denlinger, Wolfgang Windl, Alessandra Lanzara, Joshua Goldberger, and Claudia Ojeda-Aristizabal "Coexistence of Bulk Type-II and Surface Dirac Cones in PtTe₂ and PdTe₂ probed through Angle Resolved Photoemission Spectroscopy (ARPES)" (ArXiv)
- Patrick Barfield, Vinh Tran, Vikram Nagarajan, Maya Martinez, [Derek Bergner](#), James G. Analytis and Claudia Ojeda-Aristizabal, "Electronic transport mechanisms in a thin crystal of the Kitaev candidate α -RuCl₃ probed through guarded high impedance measurements" Appl. Phys. Lett. 122,243102 (2023)

- LANGUAGES

English—native language

Spanish—speak, read, and write with basic competence

MEMBERSHIPS

American Physical Society