JORDAN D. LANG - CURRICULUM VITAE

Physics Major and Undergraduate Researcher at the University of Colorado Boulder,
Former Professional Product Designer

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Skills & Proficiencies

Python ▪ C++ ▪ ROOT ▪ PYTHIA ▪ FastJet ▪ SciKit-Learn ▪ LaTeX ▪ Mathematica ▪ Design and Alignment of Basic Optical Systems ▪ Arduino and Raspberry Pi Programming ▪ Basic Analog and Digital Circuits ▪ Hardware and Product Design ▪ CAD and 3D Modeling ▪ 3D Printing Machining ▪ Illustration and Graphic Design ▪ Basic 2D and 3D Animation ▪ Professional Writing and Presentation Building ▪ Project Planning and Management ▪ Microsoft and Google Office Suites ▪ Experience with Mac, Windows, and Linux

EDUCATION

Bachelor of Arts in Physics, University of Colorado Boulder

January 2021 – Present | Expected Graduation in May 2023 | Current GPA of 4.0 / 4.0

Classes In-Progress

- Quantum Mechanics II - PHYS 4410
- Thermodynamics and Statistical Mechanics - PHYS 4230
- Introduction to Plasma Physics - PHYS 4150
- Physics Honors Thesis Preparation Class - PHYS 4610
- Introductory French II - FREN 1020

Relevant Classes

- Quantum Mechanics I - PHYS 3220
- Electricity and Magnetism I & II - PHYS 3310, PHYS 3320
- Classical Mechanics and Mathematical Methods I & II - PHYS 2210, PHYS 3210
- Foundations of Modern Physics - PHYS 2170
- Electronics Lab for the Physical Sciences - PHYS 3330
- Experimental Physics II - PHYS 2150
- Partial Differential Equations - MATH 4470
- General Chemistry I & II with Labs - CHEM 1113, CHEM 1114 , CHEM 1133, CHEM 1134
- Introductory French I - FREN 1010

Relevant Textbooks

Quantum Mechanics, McIntyre ▪ Introduction to Electrodynamics, Griffiths ▪ Classical Mechanics, Taylor ▪ An Introduction to Thermal Physics, Schroeder ▪ Plasma Physics and Controlled Fusion, Chen ▪ Modern Physics for Scientists and Engineers, Taylor, Zafiratos, and Dubson ▪ Introduction to Error Analysis, Taylor ▪ The Art of Electronics, Horowitz & Hill ▪ Mathematical Methods in the Physical Sciences, Boas ▪ Partial Differential Equations, Strauss

Academic Achievements

- APS DNP Conference Experience for Undergraduates Award Recipient | Fall 2022
- Undergraduate Research Opportunities Program (UROP) Grant Recipient | 2022-23 School Year
- Leon & Mitzi Shands Scholarship for Nontraditional Students in Physics | 2022-23 School Year
- Dean's List | Spring 2021 – Spring 2022

Extracurricular Activities

- Undergraduate Research Assistant, Heavy Ions Group | May 2022 – Present
- Poster Presentation at APS Division of Nuclear Physics Conference | Oct. 2022
  https://meetings.aps.org/Meeting/DNP22/Session/HA.114
- Undergraduate Research Assistant, Sun Group | May 2021 – April 2022
- Society of Physics Students | Spring 2021 – Present
- CU Prime Physics Mentorship Program, Mentee | Spring 2021
- Ice Skating Club | Spring 2022 – Present

Lower Division Physics Classes, City College of San Francisco

January 2018 – December 2020 | GPA of 4.0 / 4.0

Relevant Classes

- Introductory Waves, Thermodynamics and Optics with Lab - PHYC 4C, PHYC 4CL
- Introductory Electricity and Magnetism with Lab - PHYC 4B, PHYC 4BL
- Introductory Classical Mechanics with Lab - PHYC 4A, PHYC 4AL
- Linear Algebra and Differential Equations - MA 130
- Calculus I, II, III - MA 110A, MA 110B, MA 110C
- Probability and Statistics - MA 80
- Introductory Python Programming - CS 131B

Relevant Textbooks

Fundamentals of Physics, Halliday, Resnick, & Walker ▪ Introduction to Error Analysis, Taylor ▪ Calculus: Early Transcendentals, Stewart ▪ Linear Algebra and Differential Equations, Peterson

Concurrent Work

- Full-time Industrial Design Lead at Propelland | Jan. 2018 – Aug. 2020
- Part-time Designer for Propelland | Sep. 2018 – Dec. 2020

Bachelor of Industrial Design, North Carolina State University

Completed May 2013 | Valedictorian, Graduated Summa Cum Laude | GPA of 4.0 / 4.0

Academic Achievements

- Undergraduate Faculty Award for Academic Excellence in Industrial Design | May 2013
- Stephen H. Robertson Scholarship in Industrial Design | 2011
- Provost's Academic Scholarship | 2009
- Dean's List | Fall 2009 – Spring 2012

Extracurricular Activities

- Autodesk Student Expert | Aug. 2011 – May 2013
- Vice-President, Treasurer, IDSA NCSU Chapter | Aug. 2010 – May 2013
- Assistant Scoutmaster, Troop 316, Boy Scouts of America | Oct. 2008 – May 2010
- Eagle Scout, Boy Scouts of America | Aug. 2008

RESEARCH AND WORK EXPERIENCE

Undergraduate Research Assistant │ Heavy Ion Physics Group, University of Colorado Boulder
May 2022 – Present | Full-Time (Summer), Part-Time (School Year)

Assisting the Heavy Ion Physics group at the University of Colorado Boulder, led by professors Jamie Nagle and Dennis Perepelitsa, with experimental nuclear physics research. My undergraduate thesis project with this group evaluates the application of machine learning to jet momentum reconstruction in heavy ion collisions. Additionally, I supported the construction and testing of the Event Plane Detector (sEPD) for the sPHENIX detector at Brookhaven National Lab.

Notable Projects and Roles

- Machine Learning for Jet Energy Reconstruction

  My primary project is studying the use of machine learning for the reconstruction of jet momentum in heavy ion collisions, reproducing the results from arxiv.org/abs/1810.06324 by R. Haake and C. Loizides. Work includes the development of custom C++ scripts with ROOT, PYTHIA, and FastJet for generating p+p collisions, embedding them in a toy model for thermal background events, and applying jet clustering. Jets are fed into a machine learning script developed in Python using the Scikit-Learn package. Early results indicate machine learning may be influence heavily by the input distribution, rather than feature relationships. I presented early work at the APS Division of Nuclear Physics conference in October 2022, and our investigations into ML behavior are ongoing.

- sPHENIX Event Plane Detector (sEPD) Construction and Testing

  I worked with Dr. Rosi Reed at Lehigh University on the assembly of sectors for the sEPD for two weeks . While there, I identified optimizations for the construction process, most notably reducing polishing time from roughly 8 hours to under 2 hours with improved surface quality. I compiled optimizations into a reference document that was used to onboard REU students. In addition, I supported sEPD sector testing at CU Boulder by operating the test apparatus and assisting with sector evaluation.

Undergraduate Research Assistant │ Sun Group, JILA
May 2021 – April 2022 | Full-Time (Summer), Part-Time (School Year)

Supported the Sun Group led by Professor Shuo Sun, a photonics research group within JILA focused on quantum information science using solid state qubit platforms. My work included characterization of an organic molecule with potential quantum information applications, programming Python applications to interface with equipment, design and alignment of optical systems, and design and machining of custom parts for optics and equipment. I was also trained to use the JILA staff machine shop.

Notable Projects and Roles

- Radical Molecule Characterization

  I characterized a solid-state molecular qubit candidate using optical spectroscopy. Analysis of molecule samples was conducted with a confocal microscope and automated scanning applications I developed to determine molecule density and positions.

- Automated Position Scanning Application and Confocal Microscope

  Designed and programmed a photon count vs. position application in Python with PyQt. The application drives piezoelectric actuators on a 3-axis stage to position the sample and automatically scan across a user-defined region. A confocal microscope and laser are used to excite emitters on the sample and measure photon counts at each position, which are mapped in real time.

- Automated Spectrum Scanning Application

  Designed and programmed a photon count vs. wavelength application in Python with PyQt. The application connects to a single photon counter and variable wavelength laser to measure qubit resonance across a range of pump laser frequencies.

- Photon Detector Adapter

  Designed and machined a custom aluminum adapter mount for a single photon counting module (SPCM) that worked with a standard ThorLabs optical cage system. The apparatus used standard ThorLabs components to focus a beam onto the SPCM sensor.

Contract Designer │ Propelland, San Francisco
September 2020 – March 2021 | Part-Time

Provided design support on smaller deliverables and short-term projects while in school, including 3D modeling and illustration for Propelland's online portfolio, as well as crafting presentations and visual assets for pitches to new clients.

Industrial Design Lead | Propelland, San Francisco

March 2019 – August 2020 | Full-Time

Guided the industrial design team at the Propelland San Francisco office by leading projects and working closely with clients and key stakeholders, building proposals and scope of work estimates, and managing the team and resources, including identifying new talent to bring to the team. Day-to-day work included project management, hardware design, rapid prototyping and basic mechanical engineering, interaction design, illustration, and qualitative research, in addition to leading internal initiatives to improve the growth of Propelland.

Notable Projects and Roles

- Converse: Sustainable Customization Platform | Service Designer, Illustrator, Prototype Builder

  Supported the design and definition of innovation avenues for Converse around sustainable customization, including validation of potential technologies, service and experience design, and development of business cases and high-level execution plans for each initiative. Helped create prototypes that demonstrated the outcome of each initiative.

- Converse: Limited Edition Sneaker Display | Project Lead, Industrial Designer, Prototype Builder

  Led the hardware design, mechanical engineering, and construction of an interactive display kiosk for winning limited-edition sneakers for Converse, in addition to defining the backend experience for the production and management of additional units across global markets.

- Protección Senior | Project Lead for Hardware, Prototype Builder

  Led the industrial design, and construction of functional prototypes, for a smart watch and home touchscreen device for older adults, promoting health and social enrichment activities. The watch is now available in Europe, bundled with a smart speaker device on which I previously led the UI design. https://proteccionsenior.com

- Samsung: Unreleased Wellness Platform | Service and Interaction Designer

  Supported the design and definition of a wellness platform for Samsung. Interviewed and collaborated with experts across multiple health and wellness categories, performed qualitative research, and designed algorithm structures and a prototype app interface.

Senior Industrial Designer | Propelland, San Francisco

January 2017 – February 2019 | Full-Time

Led and supported projects primarily through the design of physical products and services while working directly with clients and key stakeholders. Work included rapid prototyping, design for manufacturing, project management, leading ideation and workshop sessions, user interface design, illustration, presentation building, qualitative research, and project planning.

Notable Projects and Roles

- Powerade: Command Center for Personalized Hydration | Project Lead, Industrial Designer, Prototype Builder

  Led qualitative research prior to starting the project to identify key needs and values for professional athletes. Planned and led the design and construction of a functional prototype which included a field-of-play cart with bioimpedance sensors and scale, two tablet interfaces for viewing athlete data and customizing drink formulas, and a basic dispenser system that mixed formulas and flavors.

- Splash: Water Stations Design for Manufacturing | Project Lead and Industrial Designer

  Converted existing water hygiene station designs from Splash for roto-mold manufacturing. Stations are used in elementary schools, with features for easy maintenance, durability, and distribution. Now installed at schools throughout India and Ethiopia. https://splash.org/social-enterprises

- Coca-Cola: Unreleased Smart Fridge | Prototyping Lead, Industrial Designer, Prototype Builder

  Led design and construction of a functional smart fridge prototype for Coca-Cola, integrating a refrigerated compartment, hot and cold water, ice dispenser, and computer vision for inventory detection. Showcased at the 2018 Coca-Cola Bottlers Convention.

- Coca-Cola: Soda Shoppe | Project Lead, Designer, and Illustrator

  Led co-creation workshops with the Coca-Cola team, and later lead the definition and design of an experiential craft soda popup built into a shipping container. The Soda Shoppe was piloted by Coca-Cola.

Product and Service Designer | Propelland, San Francisco

January 2014 – December 2016 | Full-Time

Supported projects by designing physical and digital products and services and leading deliverables. Work included rapid prototyping, design for manufacturing, user interface design, illustration, presentation building, qualitative research, and high-level project planning.

Notable Projects and Roles

- Powerade: Sports Bottle for FIFA World Cup 2014 | Industrial Designer

  Supported the design and prototyping of electronically illuminated sports bottle sleeves for Powerade, including aesthetic design and design for manufacturing while working within waterproofing and electronics constraints.
- Powerade: Cooling Towers for UEFA Euro 2016, Copa America 2016, 2016 Brazil Olympics, Cricket World Cup 2019 | Project Lead, Industrial Designer, Prototype Builder

  Led the design exploration and prototyping of water bottle transport and cooling towers for Powerade. Oversaw manufacturing of towers in Spain for the UEFA Euro 2016.
- Audi: MyMemories | Service Designer and Illustrator

  Supported co-creation workshops, defined and visualized user experience journeys of multiple concepts for an innovation project with Audi, one of which was piloted as MyMemories that records the driving experience with vehicle cameras. https://www.audi.com/en/innovation/development/audi-mymemories.html
- Kaiser Permanente: Unreleased Symptom Checker and Self Triage App | Interaction Designer

  Supported app architecture and decision trees, and led interaction and interface design for a proof-of-concept mobile app.

User Interface and Rich Media Specialist | James B. Hunt Jr. Library, NCSU

June 2013 – December 2013 | Full-Time

Full-time user interface and experience designer for the James B. Hunt Jr. Library. Designed touchscreen control interfaces for multiple large format displays and media rooms, in addition to web-applications for building content and presentations for the media rooms to help professors and students.

Notable Projects and Roles

- GameLab Control Tablet Interface | Interaction and UI Designer
- Large Media Room Content and Presentation Builder Web App | Interaction and UI Designer

User Interface Designer | James B. Hunt Jr. Library, NCSU

May 2012 – May 2013 | Part-Time

Part-time UI designer for the James B. Hunt Jr. Library. Designed interactions for the digital book browsing touchscreen connected to the Book Bot, and contributed to the design of the GameLab space during the library's construction.

Notable Projects and Roles

- Digital Book Browsing Interface for Hunt Library Book Bot | Interaction and UI Designer

Game Design Artist for Cross-Discipline Undergraduate Projects | North Carolina State University

January 2010 – May 2013 | Part-Time

2D and 3D artist, animator, and illustrator for several student-led game projects for cross-college game design and development classes. Digital artist for the I.C. Crime undergraduate research project, a crime scene digitization and virtual investigation tool developed at NCSU's computer science and design departments.

Notable Projects and Roles

- NOL: On-rails Platformer with Gesture Controls for NCSU Hunt Library | Creative Director, Lead 3D Artist and Animator
- I.C. Crime: Virtual Crime Scene Investigation Tool (Funded Research Project) | Illustrator, 3D Artist and Animator
- Heartbeat: 3-day Game Jam Submission | Lead 3D Artist and Animator
- Propaganda: Side Scrolling Stealth Game | Lead 3D Artist and Animator