GABRIEL JURADO

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SUMMARY

A physicist with a penchant for problem solving and statistics. I have a vast timeline of programming experience and exposure to a wealth of scientific collaboration. My current focus is the analytic and computational investigation of the physical principles of information. My research has granted me extensive knowledge of complex systems, information theory, and dynamical systems theory. I have a deep familiarity with statistical mechanics in the context of both simulations and analytics. I particularly excel at data analysis, systems modeling, and applied mathematical methods. Though my research primarily revolves around information processing at the molecular level, my accumulated skill-set can translate to several other specialized fields, like large-scale macroscopic physics and dynamic business transformations.

TECHNICAL STRENGTHS

Numerical Analysis	Mathematica, Matlab
Data Science	Pandas, NumPy, SciPy, Markov Chain Monte Carlo
Languages	Python, Fortran, C
Workflow Management	Git, Linux, Overleaf
Deep Learning Frameworks	TensorFlow, Scikit-Learn
HPC	HPC, CUDA, MPI, OpenMP
Information Visualization	Plot.ly, Matplotlib, LaTeX
Software & Tools	MS Office, Jupyter, Emacs

EDUCATION

Florida State University, Tallahassee   *July 2015 - May 2020*
Master of Science
Department of Physics

California State University, San Bernardino   *August 2011 - June 2015*
Bachelor of Science
Department of Physics

WORK EXPERIENCE

Florida Geological Survey   January 2020 - Present
Internship- Part Time   *Hourly - 20+ hours/week - Unpaid*

- Current project is to develop a machine learning architecture for existing Geographic Information Systems (GIS).
- Integrate the new learning framework into the existing toolbox for ArcMAP and ArcPRO.
- Create a machine learning tool to automatically identify geomorphic features given certain external constraints.

Private Contractor   November 2020 - January 2020
Construction - Part Time   *Hourly - 20+ hours/week - $25 per hour*

- Assistant property manager for a private construction site in Lake Talquin.
- Responsible for sales, marketing, and inventory of RV World Tv.

- Restore and repair RV for sale.
- Carpentry, Masonry, Cement work.

Costco Optometry   August 2020 - November 2020
Software Engineer - Part Time   *Hourly - 20+ hours/week - $8.50 per hour*

- Developed code in Python for automatic appointment reminder application
- Established secure server communication protocol between API server and local host
- **Initiative**: I experienced some of the inefficiencies facing the optometrist and his office and I suggested automating the appointment scheduling procedure. I developed an appointment reminder application that sent a message the day before to confirm or cancel the upcoming appointment. This allowed the staff to focus more on the in-person patients and made it easier for the office to schedule appointments many months in advance.

Florida State University, Tallahassee, Florida   August 2015 - August 2020
Graduate Research Assistant-Full Time   *Salary - 60+ hours/week - $18K per year*

- Developed code in Python for machine learning models of image processing, financial data, and material systems
- Applied mathematical modeling of nonequilibrium phenomena in biological and chemical systems
- **Initiative**: In a rather unorthodox situation, I approached my principle investigator (PI) with a project idea already sketched out. I presented the project outline to the PI of the research group I wanted to join, and was approved for two years of funding.
- **Leadership:** As project lead on the research initiative, it was my responsibility to effectively integrate a new area of focus into a well established research dynamic. I accomplished this by preparing weekly lectures and participating in group research discussions.
- **Collaboration:** Science is intrinsically a collaborative effort; between members of the same research group and ultimately between groups of different research. I served as a catalyst between my groups current research focus and the research focus of various other groups by facilitating various forms of communication.

High Performance Materials Research Institute (HPMI), Tallahassee, Florida   January 2018 - August 2019
Research Assistant-Full Time   *Salary - 40+ hours/week - $18K per year*

- Developed analytical model to investigate the potential of superconductivity in transition metal bi-layer graphene.
- **Problem Solving and Judgement:** I was tasked with the objective of providing a theoretical justification for the computational results obtained by my research advisor. To this end, I began an extensive literature search that helped me best identify the approach with the most potential. I wrote a short review summarizing the current approaches to superconductivity in intercalated bi-layer graphene and proposed a Hamiltonian model that helps support the previous computational results.

National High Magnetic Field Lab (NHFML), Tallahassee, Florida July 2015 - August 2017
Research Assistant-Full Time   *Salary-40+ hours/week $ 18K per year*

- Designed, engineered, and built an optics experiment used to measure the absorption properties of solids and liquids. Used for dynamic nuclear polarization (DNP) and nuclear magnetic resonance (NMR) measurements
- Presented a detailed characterization of the dielectric properties of solids and liquids in the high-frequency regime, approaching 1 Terahertz
- **Organization and Planning:** I volunteered to present a poster of my work at the South Eastern Magnetic Resonance Conference (SEMRC).The dates of the conference are typically planned a year in advance, and I began working on the material for the poster several months in advance. This preparation

included experimental trial and error, optimization of data analysis, and effective deliverance of the material being presented. This work resulted in interest from several collaborators who attended the SEMRC.

· **Flexibility and Adaptation:** Experimental science is very much a trial by fire. It was my core objective to design, build, and utilize an optics table experiment to measure the electronic properties of materials in the high-frequency regime. Throughout the course of the objective, the experimental design changed many times and broken equipment required me to innovate and create new ways to reach the same results. The final product was simpler, more robust, and scaleable when compared to the initial design. External constraints, i.e., time and money, often force ingenuity and innovation.

Research Experience for Undergraduates (REU), Lincoln, Nebraska $\hfill$ Summer 2014
Full Time Internship - 40 hours/week

· Performed Density Functional Theory (DFT) calculations on organic and inorganic materials
· Calculated electronic properties of photovoltaic metals

Undergraduate Research Program, CSUSB, California $\hfill$ Summer 2013
Part-Time Research-20 hours/week

· Performed electrical impedance measurements to investigate the electronic properties of protonated electronic membranes (PEMs)
· Explored the potential of hydrogen fuel cells as an alternative battery with industrial, commercial, and aeronautic applications

TEACHING EXPERIENCE

- Laboratory Instructor: *20 hours/week*
    - General Physics A Laboratory
    - General Physics B Laboratory
    - Astronomy Lab
    - Physics/Tech Laboratory
- Teaching Assistant: *20 hours/week*
    - Created lectures and problem solutions for weekly homework assignments 40+ problems per week
    - Held office hours for 2-12 people twice a week for several hours
    - Helped develop framework of online teaching by providing video tutorials for lab demonstrations and practice problems during COVID-19 pandemic

PROJECTS

Thermodynamics of Information and Computation

- Performed extensive calculations of information processing in Szilard's engine
- Contributed to operator approach to dynamic transformations in information engines
- Provided evidence for the novel interpretation of information processing as a kinetic model of repeated interactions

Machine Learning Methods in Physics

- Developed Jupyter notebooks detailing introductory applications of machine learning methods for theoretical condensed matter physics
- Implemented machine learning methods to analyze various measures of business value
- Contributed content and aided in the development of a machine learning website for academic and business professionals

Lectures in Quantum Computing

- Co-presented semester long lectures on quantum computing to faculty and graduate students of the Department of Scientific Computing and Department of Mathematics

ACADEMIC ACHIEVEMENTS

Proactive Recruitment In Science and Mathematics (PRISM) Scholar	2012
American Physical Society (APS) Bridge Fellow	2015
Outstanding Teaching Assistant Award Nominee	2017
Outstanding Teaching Assistant Award Nominee	2018

INVITED TALKS & POSTERS

Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)	2014

| APS Bridge Conference | 2016 |
| South Eastern Magnetic Resonance Conference (SEMRC) | 2017 |

WORKSHOPS

| NHFML Theory Winter School - Quantum Information Meets Many-Body Physics: Entanglement, Thermalization, Chaos | 2018 |

WEBSITE

https://mendozacortesgroup.github.io/MachineLearningForHumans/