THEODOROS PANAGIOTAKOPOULOS

Ph.D Physicist ~ Modeling Engineer

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SUMMARY

Experienced **Ph.D. Physicist** specializing in **semiconductor physics**, expert in **Machine Learning** and **Data Analysis**, seeking a role to drive impactful solutions.

SKILLS

Languages: Python, Julia, R, C/C++, C#, SQL, Bash
Tools: Machine Learning, Data Analysis, Visualization
Platfroms: Linux, Git, HPC

EDUCATION

08/2019 - present **Ph.D: Physics/Material Science** — **University of Central Florida**
GPA: 4.0/4.0

10/2017 - 07/2019 **M.S.: Physics** — **National and Kapodistrian University of Athens**
GPA: 9.2/10, **Valedictorian**

10/2011 - 07/2017 **B.S. Physics** — **National and Kapodistrian University of Athens**

INDUSTRY EXPERIENCE

5/2024 – 8/2024 **Modeling Product Engineer Intern** — **ASML, Silicon Valley, CA**

- Optimized **electromagnetic** simulations for geometrical corner rounding, reducing runtime by **5%**, memory usage by **10%**, and rounding time by **70%**. These improvements were integrated into **ASML's** latest software release and adopted by customers.
- Led **electromagnetic simulations** to optimize the Transition Cross Coefficient (TCC), reducing runtime by **9%** and memory usage by **34%**. Integrated into **ASML's** latest software release for a major customer.
- **Engineered** a custom **Python library** to analyze large simulation datasets and automate pattern recognition across various system configurations.
- Collaborated with the optics team to improve the efficiency of computational lithography models.

`Python / C/C++ / Bash`

EXPERIENCE

8/2019 – present **Research Assistant** — **University of Central Florida**
DOE -NSF Funded

- Modeled the **epitaxial growth of metals on semiconductors** to minimize defects and enhance charge transport properties for **junction development**, improving simulation accuracy and material design.
- Designed and implemented a **Deep Learning Neural Network** surpassing Density Functional Theory (DFT) in speed, optimizing semiconductor fabrication simulations and accelerating material discovery workflows.
- Developed and trained a **Convolutional Neural Network (CNN)** to predict metal growth on semiconductors using voxelized atomic properties, achieving simulation-level accuracy and scalability for large-scale systems.
- Engineered a **Graph Convolutional Neural Network (GCNN)** for data retrieval, integrating it into a simulation tool to enhance the speed and accuracy of fabrication process simulations.
- **Developed three custom Python libraries:** one for modeling complex systems in fabrication processes, one for electrochemistry, and one for rendering and visualizing 3D simulation data as 2D images.
- **Developed an algorithm** for voltage control in electrochemical systems, enhancing simulation tools for cathodic reaction studies and demonstrating the superior effectiveness of non-metallic cations in CO_2 reduction.
- Engineered **Machine learning** models to predict CO_2 reduction into formate and carbon monoxide in large-scale systems, directly applicable to real-world problems for predictive modeling.
- Developed **numerical methods** and **algorithms** for CO_2 adsorption energy calculations, achieving precision in cation effect modeling.
- Created a centralized **SQL** database by organizing existing group member data, enhancing accessibility and facilitating result validation.

`Python / Julia / C/C++ / Bash` `GitHub`

10/2017 – 7/2019 **Research Assistant** — **National and Kapodistrian University of Athens**
NKUA Funded

- Designed simulations and developed a **Machine Learning** aproach for identifying dark matter particles.
- Taught **modeling** and applications of **Machine Learning**, with a focus on **feature engineering techniques**.

`Python / C/C++ / Bash` `GitHub`

TECHNICAL SKILLS

- Strong knowledge of **data structures**, designing and implementing efficient solutions for complex data challenges.
- Proficient in **data integration techniques** with **SQL**, extracting, loading, and transforming data for efficient processes.
- Expertise in **algorithm design** and linear programming
- Proficient in High-Performance Computing (HPC), specializing in Slurm for job scheduling, resource allocation, and optimization.
- Experienced in **parallel programming** and **GPU acceleration**,
- Proficient in **Git**, maintaining organized code repositories for collaborative data-driven projects.

MANAGEMENT SKILLS

- **Supervising and independently completing projects**, consistently meeting budget and deadline goals with high-quality execution.
- Proficient in **conceptualizing, planning, and executing** end-to-end data science initiatives to solve critical business challenges.
- Thriving in **diverse teams**, **fostering collaboration** and energizing **collective success**.
- Exceptional **communication and presentation skills**, bridging knowledge gaps and **ensuring clarity**.
- Excelled in **problem solving** and **analytical thinking** in dynamic evolving environments.
- **Excels in both written and verbal communication**, proficiently acquires knowledge and imparts insights with clarity.

SELECTED - PUBLICATIONS

Electronic structure of cobalt valence tautomeric molecules in different environments

Theodoros Panagiotakopoulos, Esha Mishra, Thilini K Ekanayaka, Duy Le, Talat Shahnaz Rahman, Ping Wang, Kayleigh McElveen, Jared Paul Phillips, Zaid Zaz, Saeed Yazdani, Alpha T. N'Diaye, Rebecca Y. Lai, Robert Streubel, Ruihua Cheng, Michael Shatruk and Peter A. Dowben

2022 Nanoscale link

Exploring Simulated Residential Spending Dynamics in Relation to Income Equality with the Entropy Trace of the Schelling Model

Theodoros Panagiotakopoulos,George-Rafael Domenikos , Alexander V. Mantzaris

2022 MDPI link

Direct and indirect detection of dark matter

Theodoros Panagiotakopoulos, Vasilios Spanos

2019 Pergamos library, National and Kapodistrian University of Athens link

Description of the method development for separating the Daliz from the normal π^0 in the CDF detector

Theodoros Panagiotakopoulos, Arkadios Manousakis

2017 Pergamos library, National and Kapodistrian University of Athens link