THEODOROS PANAGIOTAKOPOULOS

Ph.D Physicist

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SUMMARY

Experienced **Ph.D. Physicist** specializing in **semiconductor fabrication processes**, skilled in **Machine Learning** and **Data Analysis**, seeking a role to deliver impactful solutions.

SKILLS

Languages: Python, Julia, R, C/C++, SQL, Bash, HTML.
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 computational lithography 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.
- Developed lithography **simulations** to optimize the Transition Cross Coefficient (TCC), achieving a **9%** reduction in runtime and a **34%** reduction in memory usage, enhancing manufacturing and pre-silicon processes. These advancements were incorporated into the latest **ASML software** release.
- **Engineered** a custom **Python library** to analyze large simulation datasets and automate pattern recognition across various system configurations.
- Collaborated with the modeling and optics team to propose suggestions for increasing the efficiency of computational lithography models for mask optimization.

EXPERIENCE

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

- Engineered **numerical methods** and designed **algorithms** for **chemical potential** calculations, modeling **metal growth** on **semiconductors** for **fabrication processes**.
- Implemented **Deep Learning** and introduced a **Neural Network** to model the interaction of **metals with semiconductors**, significantly surpassing Density Functional Theory (DFT) in speed and optimizing **deposition simulations** in the **semiconductor fabrication process**.
- Developed and trained a **Machine Learning Classifier** to predict metal growth on semiconductors by modeling **long-range charge interactions**, enhancing **deposition simulations** during **fabrication processes** and improving computational efficiency while addressing limitations of previous methods.
- Developed a **Machine Learning model** to retrieve deleted data with high accuracy using a **Graph Convolutional Neural Network**, integrating it into **semiconductor simulations** to enhance the speed of **fabrication processes**.
- **Developed three custom Python libraries:** two to enhance modeling of complex metal and semiconductor systems for fabrication processes and electrochemistry, and one for **rendering** and **visualizing** 3D simulation data as 2D images. Also optimized the research group's data science library for improved **speed and performance**. .
- Designed **algorithms** to maintain constant voltage in electrochemical simulations and **integrated** them into the **simulation** tool, demonstrating the superior effectiveness of non-metallic cations over metallic counterparts in the CO_2 reduction reaction.
- Engineered **Machine Learning Algorithms** to predict CO_2 reduction to formate and carbon monoxide, enabling direct application to **real-world systems** for **data analysis** and **predictive modeling**.
- Developed **numerical methods** and **algorithms** for CO_2 adsorption energy calculations, achieving high precision in modeling cation effects in the CO_2 reduction reaction.
- Created a centralized **SQL database** by organizing existing group member data from the server, enhancing accessibility and facilitating result validation.

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

- Designed simulations and contributed to a **Machine Learning Approach** for Dark-Matter Particle Identification, overcoming challenges of extremely low temperatures with **precision and ingenuity.**
- Taught **modeling** and applications of **Machine Learning**, focusing on **feature engineering techniques** such as data cleaning and transformation to enhance model quality and relevance.

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 **data science software architecture** for optimized data workflows.
- Proficient in **High-Performance Computing** (HPC), specializing in **Slurm** for job scheduling, resource allocation, and **optimization**.
- Proficient in **Git**, maintaining organized code repositories for collaborative data-driven projects.
- Proficient in creating compelling data visualizations with **Tableau, Matplotlib, and Gnuplot** to clearly communicate complex insights.

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