



# THEODOROS PANAGIOTAKOPOULOS

Ph.D Physicist

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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++, SQL, Bash, HTML  
**Tools:** Machine Learning, Data Analysis, Visualization

**Platforms:** Linux, Git, HPC

## EDUCATION

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

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

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.
- Led lithography **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**

- Developed **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 **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, accelerating **simulations** during **fabrication processes**, addressing the limitations of previous methods, and increasing computational efficiency.
- Developed a **Machine Learning** model using a **Graph Convolutional Neural Network** for data retrieval, now integrating it into a simulation tool to enhance the speed 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.
- 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<sub>2</sub> reduction reaction.
- Engineered **Machine learning** models to predict CO<sub>2</sub> 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<sub>2</sub> adsorption energy calculations, achieving high precision in modeling cation effects in the CO<sub>2</sub> reduction reaction.
- 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** approach 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 **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 Dalitz from the normal  $\pi^0$  in the CDF detector

 **Theodoros Panagiotakopoulos**, Arkadios Manousakis

 2017

 Pergamos library, National and Kapodistrian University of Athens

 [link](#)