Panos Oikonomou

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Education

New York University Abu Dhabi (NYUAD)   Abu Dhabi, UAE | 2018 - 2022

Bachelor of Science. **Double Major in Physics and Mathematics**, Engineering Minor | **GPA: 3.87**

Research

Center for Astro, Particle, and Planetary Physics (CAP [3]), NYUAD   Abu Dhabi, UAE | August 2022 - present

Research Assistant, Particle Physics (full-time)

- **Quantization of Dissipative Systems in Hydrodynamics**
  - Creating an Effective Field Theory of acoustics in viscous liquids.
- **Dark Matter Freezout During Reheating**
  - Developing a numerical method to solve the Boltzmann equation for arbitrary source terms to predict dark matter abundance in a model-independent way under different thermodynamic initial conditions.
- **Light-1 Satellite Terrestrial Gamma-Ray Flash search.**
  - Led the analysis of the first terrestrial scientific satellite of the Arab region in collaboration with the UAE Space Agency.
  - Created a data analysis package in Python and C++, and performed stochastic calculations of corrupted data reconstruction errors, simulating the background model of the detector. Manuscript in progress.

Center for Quantum and Topological Systems (CQTS), NYUAD   Abu Dhabi, UAE | January 2022 - present

Research Assistant, Mathematical Physics

- **Quantum Information using Homotopic Type Theory**
  - Creating a framework to express the symmetry groups of common Hilbert spaces using Homotopic Type Theory.
  - Writing a Functional Programming library in Haskell that can interpret quantum circuits as braids in a Hilbert space.

Astroparticle Laboratory, NYUAD   Abu Dhabi, UAE | 2019 - 2022

Undergraduate Research Assistant, Astroparticle Physics (part-time)

- **Acoustic Signals in Viscous Liquids**
  - Led the modeling of the acoustic signal from single charged particles passing through viscous liquids using classical hydrodynamics and quantum field theory, and applied it to WIMP search on the XENONnT experiment.
  - Analytically solved classical strongly damped wave equation using spectral methods and devising a perturbative solution.
  - Quantized the dissipative system by creating an effective scalar field theory for the density of the viscous liquid.
  - Wrote a parallel adaptive mesh refinement, finite element simulation framework in C++ for solving scalar field systems in Minkowski space, and first-authored a paper
- **Multilayered Dielectric Haloscope Investigation (MuDHI)**
  - Wrote a background model simulation in GEANT4, for this tabletop dark matter experiment.
  - Analytically predicted the optimal experimental setup. Co-authored paper.
- **Photoelectric yield of spacecraft materials in the UAE Lunar Rover (RASHID)**
  - Measured the photoelectric yield of common spacecraft materials in the BEAR and BACH beamlines at Elettra Synchrotron Light Facility (Trieste, Italy). Co-authored paper.

Applied Interactive Multimedia (AIM) Laboratory, NYUAD   Abu Dhabi, UAE | 2018 - 2019

Undergraduate Research Assistant, Haptics Electrical Engineering (part-time)

- **Thermovibrotactile Funnelling Illusion**
  - Designed a control system for thermoelectric cooling (TEC) modules with rapid temperature control, outperforming literature at the time.

Publications

* Corresponding author, ⁺Principal Investigator

- **Oikonomou, P.***; Manenti, L.; Sarnoff, I.; Arneodo. F.[+] (2022) *Acoustic detection potential of single minimum ionizing particles in viscous liquids,* Physical Review Research. (Accepted with minor corrections)
- **Oikonomou, P.***; Manenti, L.; Sarnoff, I.; Arneodo, F.[+] *Effective Field Theory Formalism for the Quantization of Acoustics in Dissipative Media.* (In Progress)
- **Oikonomou, P.***; AlKindi, L.; … Arneodo, F.[+]; DiGiovanni, A.[+] *The Analysis Strategy of the Light-1 Satellite (In Progress)*
- DiGiovanni, A.*[+]; AlKindi, L.; **Oikonomou, P.**; …, Arneodo, F.[+]; *Detecting Terrestrial Gamma-ray Flashes with Cubesats: the LIGHT-1 Payload instrument;* (In Progress)
- Kalos, S.*; Arneodo, F.[+]; … **Oikonomou, P.**; … Els S.[+] (2022) *Absolute Photoelectric Yield Measurements of the Rashid Lunar Rover Materials at the ELETTRA Synchrotron Facility,* Journal of Geophysical Research. (Under review)
- DiGiovanni, A.*; Arneodo, F; … **Oikonomou, P.**; … (2022) *The Scientific Payload of LIGHT-1: A 3U Cubesat Mission for the detection of Terrestrial Gamma-Ray Flashes,* Nuclear Inst. and Methods in Physics Research A.
- Manenti, L.*; Mishra, U.*; … **Oikonomou, P.**; … Arneodo, F.[+] (2021) Search for dark photons using a multilayer dielectric haloscope equipped with a single-photon avalanche diode, Physical Review D.
- **Oikonomou, P.***; Pappas, S. (2020) *Decentralized Bioinspired Non-Discrete Model for Autonomous Swarm Aggregation Dynamics,* Applied Science.

Teaching

Multivariable Calculus, Mathematics, NYUAD   Abu Dhabi, UAE | 2022 - present

Mathematics Teaching Assistant

- Run weekly recitations and office hours on Multivariable Calculus, Linear Algebra, and Multivariate Optimization.

Conserving our Global Heritage Through Science, Core Curriculum, NYUAD   Abu Dhabi, UAE | 2022

Physics Teaching Assistant

- Run weekly labs on theory and usage of analytical techniques (FTIR, Raman, XRF) with applications to cultural heritage.

Computer Programming for Engineers, Engineering, NYUAD   Abu Dhabi, UAE | 2019 - 2021

Computer Science Lab Instructor

- Run weekly labs, office hours in C++ on Data Structures, Algorithms, Numerical Analysis, with applications to engineering.

Seminars

European Organization for Nuclear Research (CERN)   Geneva, Switzerland | 2022

CERN Winter School on Supergravity, Strings, and Gauge Theory 2022

National Technical University of Athens (NTUA)   Athens, Greece | 2018

Data Structures and Algorithms for International Olympiad of Informatics

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Community Involvement

Women in STEM (WeSTEM) student organization, NYUAD   Abu Dhabi, UAE | 2019 - 2022

Workshop facilitator

- Facilitated workshops, meetings, and information sessions to encourage participation of women in STEM
- Designed and conducted workshop for high school students on sound wave physics through interactive experiments.

Athletics Department, NYUAD   Abu Dhabi, UAE | 2022 - present

Volunteer Climbing Instructor

- Teaching beginner and advanced climbing techniques, managing and maintaining the wall.

Skills

Programming: C++, Python, R, GEANT4, Haskell, Agda, Qiskit, Java, JavaScript, Matlab, Shell Scripting, Git

Formatting: HTML, CSS, PHP, LaTeX **Software:** Mathematica, LTSpice, Cadence, Unity, Solidworks, Fusion 360, COMSOL