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Millicent Ayako

Prospective Graduate Student

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Education

Bachelor of Science in Physics , *University of Delaware* **2018 – 2022**
Bachelor of Science in Applied Mathematics, *University of Delaware* **2018 – 2022**
Minor in Computer Science
UD Presidential Scholarship, University of Delaware 2018 — 2022
DuPont Women in STEM Scholarship, DuPont de Nemours, Inc. 2018 — 2022

Technical Research Experience

Undergraduate Research Assistant & Independent Research Student **January 2021 – January 2022**
Department of Physics and Astronomy at the University of Delaware *Newark, DE*
Principle Investigator: Dr. Mark Ku

- Constructed a nitrogen vacancy (NV) center quantum sensor to study to a variety of quantum materials in order to develop new tools for probing condensed matter and materials. We specifically probed magnetic Fe5GeTe2 flakes.
- Utilized MATLAB to simulate the magnetic field generated by the NV laser system when observing samples and compared simulated and experimental results to assess the validity of my model.

Summer Research Scholar **June 2020 — August 2020**
Department of Mathematical Sciences at the University of Delaware *Newark, DE*
Principle Investigator: Dr. Gilberto Schleiniger & Dr. Bruce Boman

- Developed a MATLAB script which used a second order finite difference scheme to model healthy tissue organization using age structured population dynamics. This project was presented at the University of Delaware's annual Undergraduate Research Symposium.

Energy Research Intern **June 2019 — August 2019**
Energy Research Institute at the University of Delaware *Newark, DE*
Principle Investigator: Dr. Zubaer M. Hossain

- Investigated the degree with which the dimensional, geometric, and spatial characteristics of individual quantum dots affect the overall confinement of an array of SiGe quantum dots using COMSOL Multiphysics and MATLAB software.
- Presented findings at the University of Delaware's annual Undergraduate Research Symposium. This presentation was revised and later presented at the APS April 2020 meeting. **Moved online due to Covid-19*

Undergraduate Research Assistant & Summer Research Scholar **Sept 2018 — May 2020**
Department of Mechanical Engineering at the University of Delaware *Newark, DE*
Principle Investigator: Dr. Zubaer M. Hossain

- Investigated the role deformational and compositional heterogeneity plays on the localization of electronic states of alloy quantum dots in thermodynamic equilibrium using COMSOL Multiphysics and MATLAB software.
- Developed analytical functions to model the material composition of quantum dots using COMSOL Multiphysics and MATLAB software.

Teaching Experience

Laboratory Teaching Assistant **August 2020 – Present**
Department of Physics and Astronomy at the University of Delaware *Newark, DE*

- Instructed labs for several electricity and magnetism courses developed for students ranging from algebra based physics to calculus based electrical engineering. 300 students total.
- Emphasized various applications of physics through labs examples such as electrical impulses traveling through neurons and the construction of piezoelectric transducers.
- Prepared lectures introducing physics concepts, graded lab reports and exams, and created rubrics to aid in the transition to online learning due to COVID-19.
  - PHYS202: Intro. Physics II (Algebra) – 2022 Winter (1 section), 2022 Spring (2 sections) 90 hours total
  - PHYS208: Intro. Physics II (Calc) – 2021 Winter (2 sections), 2021 Spring (2 sections) 120 hours total
  - PHYS245: Electricity and Electronics for Engineers – 2020 Fall (2 sections), 2021 Fall (3 sections) 150 hours total

Service, Outreach, and Mentorship

President, Society of Physics Students (SPS), University of Delaware Chapter **July 2020 – May 2022**
Department of Physics and Astronomy at the University of Delaware *Newark, DE*

- Organized and led biweekly club meetings where students were presented with opportunities to get involved in physics.
- Meetings consisted of events such as research presentations from students and faculty, science presentations about various topics in physics and astronomy, and opportunities to connect with active researchers.

Member, Committee for Climate Diversity, Equity, & Inclusivity (CDEI) **July 2020 – Present**
Department of Physics and Astronomy at the University of Delaware *Newark, DE*

- Created accessible channels for communication for all levels of the department such as climate surveys and supplying reporting resources.
- Took part in the departmental hiring process several times and provided CDEI considerations for candidates though personal CDEI interviews.
- Worked with the the American Institute of Physics TEAM-UP Project through workshops and webinars to implement structural changes to improve the CDEI conditions of the DPA.
- Provided other departmental committees with quantitative CDEI consulting. Results include more diverse colloquium speakers, greater student involvement in SPS and the Physics and Astronomy Graduate Student Society, and more holistic interviews for candidates on all levels.

100,000 Strong Educational Exchange Grant Recipient **Sept 2016 – August 2017**
Delaware Summer Chinese Language Initiative for Communicating STEM Program *Beijing and Hangzhou, China*

- Attended classes at the Wanxiang Polytechnic College pertaining to Chinese language and culture as well as STEM topics concerning renewable energy.
- Wrote a thesis on the future of green architecture through sustainable building materials in developing countries using recent Chinese cultural and scientific developments.
- I presented my findings at both the Wanxiang Polytechnic College in Hangzhou, China and the Delaware Department of Education in Dover, Delaware.

Publications, Presentations, & Posters

- Chen, H. et al. Revealing room temperature ferromagnetism in exfoliated Fe_5GeTe_2 flakes with quantum magnetic imaging. 2D Mater. 9 025017 (2022)
- Yang, H. Ayako, M. Sarpong, N. Hosssain, Z. Electronic structure basis of diameter-dependent properties of carbon nanotubes. (In Review)
- Ayako, M. Hossain, Z. Electronic Confinement in SiGe Quantum Dot Arrays. Contributed Poster at the American Physical Society April Meeting, Washington, D.C. April 18, 2020 D21.00010.

Technical Skills

Tools and Languages	Mathematica, MATLAB, Python, C/C++, COMSOL Multiphysics
Quantitative Research	Optimization, Mathematical Modeling, Numerical Analysis, Data Visualization
Practical	Circuit Design, Standard Electronic Testing and Instrumentation Equipment
Relevant Coursework	PHYS468 - Introduction to Research (6 credits), PHYS650 - Quantum Computation and Information, MATH425/426 - Computational Math I/II, MATH512 - Contemporary Applications of Mathematics, MATH611 - Introduction to Numerical Discretization, ELEG628 - Solar Energy Technology and Applications, ELEG644 - Opto-electronics

Awards & Activities

- Department of Physics Student Leadership Award 2022
- Department of Physics Climate and Inclusion Service Award 2022
- Department of Physics Student Leadership Award 2021
- Society of Physics Students Fall 2018 — Spring 2022
  UD Chapter President, Fall 2020 - Spring 2022
- UD Chapter of the National Society of Black Engineers Fall 2018 — Spring 2022
- Delaware African Students Association Fall 2018 — Spring 2022
- Society of Black Physicists Fall 2018 — Spring 2022