

Akeem Hart

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Education

PhD - Physics

QUEEN MARY UNIVERSITY OF LONDON

London, UK

Sep. 2022 - Present

MSc - Physics

KING'S COLLEGE LONDON

London, UK

Sep. 2019 - Jul. 2021

BSc with Honours - Physics

DURHAM UNIVERSITY

Durham, UK

Oct. 2016 - Jun. 2019

Various A-Levels and GCSEs

KING EDWARD VI ASTON SCHOOL

Birmingham, UK

2009-2016

Research Experience

DUNE & MINERvA collaborations via Particle Physics Research Centre, QMUL

PHD STUDENT

London, UK

Sep. 2019-Jan. 2021

- Extended the MINERvA data preservation software to enable future analyses of the performance of Monte-Carlo simulations when simulating specific muon interactions.
- Assisting in installation and testing of DUNE 2x2 LArTPC prototype at Fermilab.
- Assisting in the integration of the Data Acquisition system for the MINERvA modules at the DUNE 2x2 LArTPC prototype at Fermilab.

Experimental Particle and Astroparticle Group, King's College London

MSc STUDENT

London, UK

Sep. 2019-Jan. 2021

- Utilised Geant4 and WCSim, a Geant4 based framework to simulate the operation of the world's largest precision measuring instrument for nucleon-decay and neutrino studies and one of the largest physics experiments in the world, Hyper-Kamiokande.
- Developed a novel machine-learning clustering algorithm to address the weaknesses of existing methods (See Projects & Portfolio)

Optics Labs, Durham University

GROUP MEMBER

Durham, UK

09/2018 - 04/2019

- Performed both led and unled optical investigations.
- Gained practical experience with a variety of different equipment and techniques, including but not limited to:
 - Cryogenic Cooling
 - Laser Handling
 - Cleanroom use

AstroLab, Durham University

GROUP MEMBER

Durham, UK

09/2017 - 04/2018

- Captured & processed telescope imagery of distant galaxies.
- Gained practical experience in astronomy and experimental astrophysics.

Projects & Portfolio

Development of a novel clustering algorithm for particle physics detectors

King's College London, London, UK

09/2019 - 01/2021

- Developed a novel clustering algorithm for use at the upcoming neutrino detector, Hyper-Kamiokande.
- Simulated the experimental operation and associated particle physics phenomena using WCSim and ROOT.
- Utilized several different programming languages, predominantly C++, writing optimised code.

Investigation of the presence of dark matter in NGC-3198

Durham University, UK

09/2017 - 04/2018

- Captured and processed telescope imagery of elliptical galaxy NGC-3198.
- Gained experience in telescope operation and developed experimental and observational astrophysics skills.
- Used the processed imagery to develop rotation curves and then a mass distribution of the galaxy by using the virial theorem.
- Demonstrated that the observed mass distribution is inconsistent with only the visible matter but very consistent with a model incorporating dark matter indicating that this galaxy may be predominantly dark matter.

Simulation of soliton collisions in a Bose-Einstein condensate

Durham University, UK

09/2018 - 01/2019

- I used analytical and mathematical methods to solve the Gross-Pitaevskii equation, which describes the behaviour of a Bose-Einstein condensate, using the split-step Fourier method.
- Wrote code in Python to iterate this solution for a variety of starting conditions.
- Verified my simulated results through comparison with experimental results found in available literature.

Investigation of the optical properties of plant-based dyes

Durham University, UK

09/2018 - 04/2019

- Collaborated with another student to plan and executed a series of investigations into the optical properties of anthocyanin, betalain and chlorophyll to ascertain the feasibility of their use in organic solar cells.
- Extracted and purified said organic compounds from readily available plants, gaining experience in chemical processing & handling.
- Deepened existing experience of conducting precision-sensitive optics experiments.

Open-Source Contributions

AstroPy

- AstroPy is an astronomy & astrophysics package for Python.
- I conducted maintenance work and bug fixes within the cosmology modules in this package.
- Contributed to a paper submitted to the Astrophysical Journal and the Journal of Open Source Software

Gala

- Gala is a Python package for simulating and calculating galactic and gravitational dynamics.
- I implemented a faster approach to determining the apoapsis & periapsis of a given orbit.

ROOT

- ROOT is a C++ based data analysis program and library used in many areas of experimental and theoretical physics.
- I am currently in the process of resolving minor bugs.

SciPy

- SciPy is a scientific computing package at the core of Python's scientific computing capabilities.
- I performed bug fixes and maintenance work within the statistics modules in this package

SciKit-Learn

- SciKit-Learn is a widely used machine learning package for Python.
- I am currently in the process of resolving minor bugs

Technical Skills

Programming & Scripting Languages, Bash, Python, C, C#, C++, Java, JavaScript, TypeScript

Operating Systems, Linux, Windows

Software and Tools, Microsoft Office, \LaTeX , SQL, LabView, Geant4, ROOT, Git, SVN

Languages, English - Native

Other Professional & Volunteer Experience

Software Engineer

SIEMENS INDUSTRY SOFTWARE LTD

Cambridge, UK

Jan. 2022 - Sep. 2022

Sales Team Member

CLARKS LTD

Birmingham, UK & London, UK

Jun. 2018-Mar. 2020

Stockroom Assistant

NUTTERS FASTENINGS LTD

Birmingham, UK

Jun. 2014-Jul. 2016

Customer Service Assistant

BRITISH HEART FOUNDATION

Birmingham, UK

Jun. 2015-Jul. 2015

Miscellaneous Information

- Institute of Physics Affiliate Member 2015-2019
- Institute of Physics Member 2021-Present
- Nationality: UK, Jamaica

Publications

- Astropy Collaboration et al "The Astropy Project: Sustaining and Growing a Community-oriented Open-source Project and the Latest Major Release (v5.0) of the Core Package" The Astrophysical Journal, Volume 935, Issue 2, id.167, 20 pp. August 2022. DOI: 10.3847/1538-4357/ac7c74.