# Hitham Hassan

Ph.D. Candidate | Software Developer | Data Scientist
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## LINKS

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## BIO

Enthusiastic and hard working **software developer**, **data scientist** and **Ph.D. researcher** in theoretical particle physics with well-honed **academic**, **technical**, **professional** and **interpersonal skills** including a proven ability to **communicate** complex scientific concepts to **diverse audiences**.

## SKILLS

### Technical Skills

Experienced:
C/C++ • Python • CI/CD • Git • Linux/Unix • Bash/Shell • LaTeX • Data Science • Software Development • High Performance Computing • Statistical Analysis • Primary and Secondary Databases • Data Visualisation • Docker & Containerisation • Multithreading / Multiprocessing

Familiar:
Machine Learning • HTML • CSS JavaScript • Fortran • SQL • XML

### Professional & Interpersonal Skills

Science Communication• Confident Presentation• Management • Leadership • Strong Work Ethic • Time Management • Teamwork • Problem Solving

### Languages

English (native)
Arabic (fluent)
French (highly proficient)

## AWARDS

**St. Cuthbert's Soc., Durham University**

- New Student of the Year (2015).
- Ranald Michie Prize (2016).
- Principal's Award for Outstanding Contribution to College Life (2019).

## INTERESTS

- Research
- Science Outreach
- Machine Learning and Data Science
- Computational Physics and Biology
- Climate Science
- Informatics and Bioinformatics

## EDUCATION AND RESEARCH EXPERIENCE

### PH.D. CANDIDATE IN THEORETICAL PARTICLE PHYSICS

IPPP, Durham University
Oct 2019 - Present (expected submission: 31/03/2023)
Examination results: 99.5%

- **Developing software** implementation of a merging procedure for **Monte Carlo** simulations of particle collisions at the LHC.
- Using **C++** to develop applications for use on **high performance computing** systems following a **test-based** approach.
- Working in the **Linux/Unix** environment and with **version control** systems in `GitLab`, using **continuous integration** to streamline the development process.
- Using **Python** to interpret **data structures** in predictions made with High Energy Physics (HEP) software and perform **statistical analyses** of the results.
- Displayed strong **management** and **organisational** skills in **organising conferences** and in **teaching** undergraduate students in **physics** courses and teaching postgraduate students in **data science** and **high performance computing** courses.

### M.SCI NATURAL SCIENCES IN MATHEMATICS AND PHYSICS

Durham University
Oct 2015 – July 2019
Classification: First Class Honours
Thesis: *Jet Multiplicity Measurements at the LHC*

- Integrated Masters degree in **mathematics** and **physics**, specialised into **theoretical** and **computational particle physics**.
- Topics include: **Numerical Analysis**, Probability and **Statistics**, Partial Differential Equations, **Analysis in Many Variables**, Complex Analysis, **Quantum Computing** and Optics, Quantum Field Theory, Condensed Matter Theory.

### SUMMER RESEARCH STUDENT

IPPP, Durham University
Jul 2018 – Aug 2018

- **Awarded** one month studentship at the IPPP, Durham producing predictions for Higgs boson production at the LHC with **Monte Carlo** event generators.
- Produced sophisticated tools in **Python** to **pre-process** the data as **images**.
- Produced simple unsupervised **machine learning** analysis in **Python** (w/ `sklearn`) to classify the production mechanisms of the Higgs.

## SELECTED PRESENTATIONS

### PROFILING APPLICATIONS IN C/C++ AND PYTHON

Oct 2022 | IPPP Computing Seminar Series, Durham University
Presentation Material Available Online

### ALL-ORDER MERGING OF HIGH ENERGY AND SOFT-COLLINEAR RESUMMATION

Aug 2022 | ISMD 2022, Pitlochry, Scotland
Presentation Material Available Online

### PYTHON PROJECTS AND UNIT TESTING

Feb 2022 | IPPP Computing Seminar Series, Durham University
Presentation Material Available Online

### DEBUGGING C++ WITH GDB

Nov 2021 | IPPP Computing Seminar Series, Durham University
Presentation Material Available Online

## SELECTED PUBLICATIONS

### HIGH ENERGY RESUMMED PREDICTIONS FOR THE PRODUCTION OF A HIGGS BOSON WITH AT LEAST ONE JET

Submitted Oct 2022 • Journal of High Energy Physics • preprint: arXiv:2210.10671

# EMPLOYMENT AND SUPPORTING EXPERIENCE

### PRESIDENT OF YTF22 CONFERENCE ORGANISING COMMITTEE

IPPP, Durham University
Sept 2022 - Jan 2023

- Led the **organisation** of a **hybrid conference** of ∼**80 in-person** and ∼**40 online** attendees for early career researchers from around the UK.
- Displayed strong **organisational** and **management** skills in **directing a committee** of 10 for the months before and after the conference.
- Secured **funding** amounting to over 5,000 GBP from several sponsors including the Institute of Physics and other **academic** and **corporate institutions**.
- Ensured smooth running of the conference by **managing the available time** to overcome **logistical** hurdles well in advance of the conference and oversaw the **publicising** of the event to other institutions.
- Gathered experience producing **risk assessments** and taking **health and safety** precautions for large events.
- Conference **website available** online and hosted by Indico

### ORGANISER OF IPPP COMPUTING SEMINAR SERIES

IPPP, Durham University
Jan 2022 - Present

- **Co-organised** internal speakers for the IPPP computing club seminar series on interesting topics related to and outside the scope of research at the IPPP to an audience of **postgraduate students**, **postdoctoral researchers** and **senior academics**.
- Gained **logistical** experience in hosting regular events in the work environment (e.g. room booking, **risk assessments**, **timetabling** and liaising with speakers).
- Presented (see selected presentations above) several topics including **unit testing**, **profiling**, **debugging** during this seminar series to audiences with **diverse** backgrounds.

### TEACHING ASSISTANT

Durham University
Oct 2018 - Present

- Employed part time by Dept. of Mathematical Sciences (2018-2019) and Dept. of Physics (2019-present) as a **homework/examination marker** and **postgraduate teaching assistant** in: Complex Analysis (2018-19), Relativistic Electrodynamics (2019-22), Quantum Theory (2019-23), Classical Mechanics (2019-23).
- Marking role involves producing **constructive feedback** for students on their scripts and **liaising** with the lecturers to outline where students struggled such that the teaching can reflect this.
- Teaching assistant role involves preparing for workshop style lessons, demonstrating the material during the workshops (twice weekly, each with ∼ 40 students) and **interacting constructively** with students to ensure their comprehension.
- 2022: Taught **postgraduate students** in practical demonstration sessions on **data science** techniques and **high performance computing** including **OpenMP** and **MPI**.

# COURSES, WORKSHOPS AND CONFERENCES

- Course: **EMBL-EBI Introductory Bioinformatics** (Aug 2022)
- Conference: **International Sympososium on Multiparticle Dynamics (ISMD) 2022** (Jul 2022)
- Course: **Introduction to Profiling with the Intel toolchain** (Jun 2022)
- Workshop: **15$^{th}$ Monte Carlo Net Summer School and Kraków School of Theoretical Physics** (May 2022)
- Course: **STFC Summer School on Data Intensive Science** (Sept 2021)
- Course: **DCAD - Effective Remote Working** (May 2020)

# OUTREACH AND EXTRA-CURRICULAR

### MEMBER OF EQUITY, DIVERSITY AND INCLUSION COMMITTEE

IPPP, Durham University
Oct 2021 - Present

- Organised, led and participated in in-depth discussions related to **equity**, **diversity** and **inclusion** (EDI) in our department.
- Examined and interpreted **data** relevant to EDI initiatives in department and have transmitted these to other departments.
- Co-drafted an inclusive **code of conduct** to be used in future conferences in the research group.

### MEMBER OF OUTREACH COMMITTEE

IPPP, Durham University
Oct 2019 - Present

- Produced and held **demonstrations** on science to schools and the **general public** at such events as *Celebrate Science* and *Pint of Science*.
- Responsible for producing and maintaining **technical apparatus** used in demonstrations including a Galton board and a model dark matter detector, instructions for use hosted on my IPPP website.
- Founder of cloud chamber project: we produce a sophisticated simulation of a cloud chamber for use in outreach demonstrations at schools (written in `C++` and **WASM** with code hosted on `GitLab`).

**REFERENCES AVAILABLE ON REQUEST**