

TOM G. HARDY

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Award-winning 4th year physics and astronomy MPhys Student at **Durham University** with **three summers'** academic research experience (including at **Cambridge** and **Oxford**); a particular interest in **galaxy evolution**, **AGN** and **large-survey astronomy**. Experience in astronomy from **LIGO** to **MeerKAT**, and past projects have covered from ML statistical inference all the way to exoplanetary detection.

EDUCATION

2022-2026 UNIVERSITY OF DURHAM

MPhys: Predicted Class I

- **Project:** 'Identifying EELGs from VLT-MUSE Massive Cluster Observations'.
- Florence Nightingale and Laboratory Module transcript awards and Full Palatinate (Blue-equivalent).
- Co-chair of Physics Staff-Student Committee; lead student representative to the Board of Studies.
- Music Director of nationally leading DUBB – awarded £8,000+ in arts grants.

2015-2022 JOHN HAMPDEN GRAMMAR SCHOOL

A-Levels: A*A*A*A*A*

GCSES: 9999999999

- Nationally leading A-level and GCSE results. Nationally leading GCSE 'value added'.

RESEARCH EXPERIENCE

One co-authored paper in the Journal of Physics Education (100+ citations). One paper in review as referee (with MIGHTEE-HI group at Oxford), one paper in prep (with Dr James Alvey at IoA Cambridge).

Summer Internship Positions

2025 INSTITUTE OF ASTRONOMY, CAMBRIDGE UNIVERSITY

'Machine Learning Tools for Gravitational Wave Mismodelling'

Supervised by Dr James Alvey.

- **Skills:** Machine learning, SBI, Bayesian inference, GPU computing, GW astronomy, signal processing.
- Collaboration with research at UVA, MPA Garching and follow-up work with LVK collaboration.
- Started and ran weekly interns group meeting/journal club.

2024 DEPARTMENT OF PHYSICS, OXFORD UNIVERSITY

'Source Extraction for Radio-Detected HI Galaxies'

Supervised by Prof Matt Jarvis and Dr Catherine Hale.

- **Skills:** Radio astronomy, large survey data, HPC (Glamdring), MPI, source extraction, galaxy evolution.
- Built pipeline for MeerKAT radio-HI extraction for large-survey future with SKA.
- Attended Breakthrough Listen and Steven Balbus conferences.

2023 DEPARTMENT OF PHYSICS, DURHAM UNIVERSITY

'The Impact of AI in Physics Education: A Comprehensive Review from GCSE to University Levels'

Supervised by Dr Will Yeadon.

- **Skills:** LLM prompt engineering, deep learning, RAG, large data processing, HPC.
- Built pipeline for early LLM deep learning and evaluation from Physics exams & lecture notes.
- Highly cited proceedings publication co-authored with supervisor (100+ citations).

Academic Projects

2025 MPhys PROJECT

'Identifying EELGs from VLT-MUSE Massive Cluster Observations'

Supervised by Prof Alastair Edge.

- **Skills:** Survey astronomy, galaxy evolution, integral field spectroscopy, line ratio astrophysics.
- Building representative population of nearby EELGs as spectral analogues for high-z JADES candidates
- Chair of the MPhys interdisciplinary research group

2024 ASTROLAB – BSC PROJECT EQUIVALENT

'A New Comprehensive Photometric Model for the W-Type Eclipsing Binary GW Cep'

Supervised by Prof Mark Swinbank and Prof Alastair Edge.

- **Skills:** Photometry (+instrumentation), timeseries, statistical inference, Roche lobe simulations.
- Use of 14-29' reflectors to capture eclipsing binary photometry, and comparison with LTT and Roche lobe photometry models to model stellar dynamics and third body motion with 12-Page report.
- Awarded Florence Nightingale Award for Graphical Excellence and highest mark in lab (82%).

2023 YEAR 3 COMPUTING PROJECT

‘Investigating Colloidal Crystalline Freezing Using Massively Parallel Monte Carlo Simulations’

Supervised by Dr Nick Bristowe

- **Skills:** HPC, massive parallelisation, theoretical soft matter, MCMC, entropy structure formation.
- Built massively parallelised 3D many-body MCMC simulations for entropy-driven colloidal structures.
- 9-Page report, academic poster and seminar talk; collectively awarded 78% (highest in group).

PRESENTATIONS

Given

Nov 2025 Institute of Astronomy: Cambridge University

‘Precision Machine Learning Tools for Gravitational Wave Models’

- Invited speaker for IoA Alumni 30-year Anniversary Event.

Aug 2025 Institute of Astronomy: Cambridge University

‘Machine Learning Techniques to Detect Gravitational Wave Mismodelling’

- Summer internship end-of-project presentation.

Aug 2024 Department of Physics: Oxford University

‘Source Extraction for Radio-Detected Hydrogen Galaxies’

- Summer internship end-of-project presentation (astronomy specific).

Aug 2024 Exeter College: Oxford University

‘Source Extraction for Radio-Detected Hydrogen Galaxies’

- Summer internship funding source presentation (general physics audience).

Contributed

Aug 2023 Department of Physics: University of Leeds

‘The Impact of AI in Physics Education’

- Given by Dr Will Yeadon; early LLM physics reasoning evaluation work.

AWARDS

2025	Florence Nightingale Award, Department of Physics, Durham University. Awarded to best data presentation in a laboratory report. One awarded per year.	£100
2025	Full Palatinate, Durham University. Highest award for contribution to Durham University Music. Awarded for my 2025 DUBB tour: ‘Unspoken Voices’ highlighting marginalized voices in Jazz. Full Blue-equivalent.	-
2023	Module Award, Department of Physics, DU. Awarded for highest laboratory score in year (89%).	£100

RESPONSIBILITIES

- 2025- Chair:** Durham MPhys Interdisciplinary Group.
- 2022- Co-Chair, previously representative (with Prof Alis Deason):** Durham Physics Staff-Student Committee.
- 2022- Lead Representative:** Durham Physics Board of Studies. (Regularly selected to represent dept to guests of Chancellor).
- 2024-26 Director:** Durham University Big Band & Studio Orchestra (Founder). Awarded over £8,000 in grants and championed marginalised voices in Jazz. Led two national tours and outreach to County Durham.
- 2022-24 Director:** Durham University Jazz Orchestra and **Creative Director:** Durham University Jazz Society.

SKILLS

- **COMPUTATIONAL:** Python/Bash/Rust, HPC (Unix), MPI, GPU (jax), pytorch, MPDAF, agentic LLMs.
- **STATISTICAL:** SBI, inference, large survey statistics, MCMC, ML, frequentist statistics.
- **ASTRONOMY:** Galaxy evolution, gravitational waves, radio astronomy, timeseries astronomy, IFU.

ADDITIONAL EMPLOYMENT

2020- COMPOSER, ORCHESTRATOR AND MUSIC PUBLISHER

- Internationally recognised musician in my spare time. **Winner of Au International Arranging prize in 2025.**
- Clients include Metropole Orkest, Danish Radio Symphony, BBC, Royal Netherlands Air Force.
- Commission Venues include Ronnie Scott’s (headlined in 2023) and Berlin Konzerthaus.
- Represented Arts Council UK to HRH Prince Edinburgh in 2023. Previously in-house arranger for NYJO.

2015-2025 PRIVATE PHYSICS & MATHS TUTOR

County Durham, London and Buckinghamshire.

2022-2023 LEVELLING UP: FUTURES IN STEM

County Durham - Tutor/Mentor on STEM outreach programme to low-HE uptake areas.