

Martin Dyer — Curriculum Vitae

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Education

2015–2019 **PhD** in Astronomy UNIVERSITY OF SHEFFIELD, SHEFFIELD, UK
Awarded 10 Jan 2020

2011–2015 **MPhys** in Physics and Astronomy DURHAM UNIVERSITY, DURHAM, UK
Class II Division 1 (Honours)

Research Experience

2019–present **Post-doctoral Research Associate** UNIVERSITY OF SHEFFIELD, SHEFFIELD, UK

I am part of the Gravitational-wave Optical Transient Observer (GOTO) project to build wide-field, robotic survey telescopes to follow-up of gravitational-wave detections.

- Developed and enhanced the GOTO control software to optimise observations.
- Extended the prototype control system to account for additional unit telescopes.
- Explored methods and strategies to expand the control system to cover additional telescopes and observing sites.

I am also involved with the Solar Activity Monitor NETWORK (SAMNET) project.

- Initiated a design study including hardware and software requirements.
- Investigated necessary changes and additions to the GOTO control software for use with the SAMNET telescopes.

2015–2019 **PhD Researcher** UNIVERSITY OF SHEFFIELD, SHEFFIELD, UK

I was integral to commissioning the GOTO prototype telescope on La Palma.

- Developed software in Python to control the instrument hardware and automate telescope operations, including reacting to any internal errors or external conditions.
- Created an alert monitoring system to process and automatically follow up on alerts produced by NASA telescopes, gravitational wave detectors and other sources.
- Designed target scheduling algorithms to calculate observation priority, in order to maximise the efficiency of the automated system.
- Implemented the above systems on the physical hardware in La Palma, and supported nightly operations both physically and remotely through on-site observers until the automated systems had been thoroughly tested.
- Created a theoretical optical throughput model of the system to assist commissioning and predict required exposure times for observing strategies.
- Assisted the telescope commissioning programme including hardware construction, alignment and collimation of the telescopes, and characterisation of the instruments.
- Designed and constructed custom hardware units to interface with the telescope dome and monitor internal conditions.

2016–present **Core member** of the ULTRACAM team UNIVERSITY OF SHEFFIELD, SHEFFIELD, UK

I have been an observer on multiple runs using high-speed astronomical instruments: ULTRASPEC on the Thai National Telescope in Thailand (and remote from Sheffield); ULTRACAM on the New Technology Telescope at La Silla, Chile; and HiPERCAM on the Gran Telescopio Canarias on La Palma, Spain.

- Operated each instrument during the nightly observing runs.
- Reduced and analysed incoming data in real-time.
- Created schedules for each night, based on submitted proposals and time allocated.
- Carried out maintenance and hardware checks on the instruments themselves, including mounting and unmounting ULTRACAM before and after each run.
- Produced nightly and post-run reports detailing the observations completed.

Teaching Experience

- 2017–2019** **Organiser** of code collaboration meetings
I founded and led an informal code review and collaboration society within the Sheffield Astronomy group for PhD students and post-docs.
- Organised fortnightly sessions involving volunteers demonstrating code, giving presentations or asking for advice on particular problems.
 - Presented talks on coding-related subjects, including using Git and GitHub, code editors, style guides and demonstrations of Python modules or features.
 - Coordinated small group projects over multiple sessions to develop coding skills.
- 2016–2018** **Teaching Assistant** for 3rd year undergraduate Physical Computing module
I was the Teaching Assistant for this new module for two and a half years.
- Supervised computing and electronics lab sessions.
 - Assisted creating and refining the module contents based on feedback from students.
 - Covered lectures and lab sessions when the lecturer was away.
 - Developed mark schemes for assessments and provided feedback to students.
 - Marked class quizzes and final group reports.
- 2015–2016** **Teaching Assistant** for 1st year Laboratory and Professional Skills module
I was one of several Teaching Assistants in the undergraduate physics laboratories.
- Demonstrated core physics experiments.
 - Assisted students carrying out experiments from lab sheets.
 - Marked student's lab reports.

Skills

- **Programming:** Expert-level Python, experience with C, Cython, VHDL, Bash.
- **Scientific Python:** Modules including `numpy`, `scipy`, `pandas`, `astropy`, `astroplan`, `pysynphot`, `voeventparse`.
- **Python programming:** Experience includes creating and packaging modules, asynchronous code using `asyncio`, serial hardware communication, communication between scripts using PyRO, file I/O including FITS and JSON, interaction with SQL databases, Slack integration, speed optimisation and unit testing.
- **Software Development:** Sole maintainer of multiple core packages for the GOTO control system, experienced at using git for version control and GitHub for issue tracking, collaboration and documentation.
- **Other Computing:** Experienced with both Linux (Ubuntu, Debian, CentOS) and Windows, hardware programming including embedded systems and FPGAs, MySQL/MariaDB, HTML/PHP, \LaTeX .
- **Graphic design:** Experienced at using Inkscape for vector graphics, applied to scientific communication including posters and presentations.
- **Communication:** Experience with oral presentations both to scientific audiences and the general public.

Professional Qualifications

- **Fellow** of The Higher Education Academy (FHEA). Awarded 18 Aug 2019.

Awards and prizes

- **Royal Astronomical Society Best Poster Award** for the best student poster at the 2018 European Week of Astronomy and Space Science (EWASS) conference in Liverpool, UK.
- **Best Physics and Astronomy Presentation** for PhD students at the 2018 Sheffield PGR research day.
- **“Most likely to change the world” — Winner** at HackSheffield 2017 for *the Happy News Channel*, a website that used machine learning to classify and filter out negative news stories.
- **“Best bingo or arcade game” — Runner up** at HackSheffield 2018 for *Wikipedia Bingo*, a game that uses Wikipedia articles to play bingo with common English words.

Publications

First author papers

- **“A telescope control and scheduling system for the Gravitational-wave Optical Transient Observer”**
Dyer, M. J. *et al.* 2018 SPIE Conference Series, 107040C. DOI: 10.1117/12.2311865. arXiv: 1807.01614.

Co-authored papers

- **“The evolutionary status of Cataclysmic Variables: eclipse modelling of 15 systems”**
McAllister, M. *et al.* 2019 MNRAS 486. DOI: 10.1093/mnras/stz976. arXiv: 1904.01888.
- **“Rotational variation of the linear polarization of the asteroid (3200) Phaethon as evidence for inhomogeneity in its surface properties”**
Borisov, G. *et al.* 2018 MNRAS 480. DOI: 10.1093/mnras/sly140. arXiv: 1807.11842.
- **“PTF1 J082340.04+081936.5: A Hot Subdwarf B Star with a Low-mass White Dwarf Companion in an 87-minute Orbit”**
Kupfer, T. *et al.* 2017 ApJ, 835, 131. DOI: 10.3847/1538-4357/835/2/131. arXiv: 1612.02019.

Conference presentations and posters

- **“The Gravitational-wave Optical Transient Observer”**
Poster. Enabling Multi-Messenger Astrophysics, STScI, Baltimore, Maryland, USA, 25–26 Apr 2019.
- **“A telescope control and scheduling system for the Gravitational-wave Optical Transient Observer”**
Oral presentation. SPIE Astronomical Telescopes + Instrumentation, Austin, Texas, USA, 11 Jun 2018.
Recorded presentation DOI: 10.1117/12.2311865.
- **“GOTO update: Telescope Control & Robotic Operations”**
Oral presentation. GOTO Science Meeting, University of Warwick, UK, 11–13 Apr 2018.
- **“Telescope control and scheduling for the Gravitational-wave Optical Transient Observer”**
Poster. European Week of Astronomy and Space Science, Liverpool, UK, 3–6 Apr 2018.
- **“The GOTO Telescope Control System (G-TeCS)”**
Oral presentation. GOTO Science Meeting, University of Warwick, UK, 19–20 Jun 2017.
- **“GOTO Telescope Control System Proposals”**
Oral presentation. GOTO Science Meeting, University of Warwick, UK, 29 Jun 2015.

Outreach

- **“Things that go bang in the night”**
60-minute public talk. Maidenhead Astronomical Society, 6 Mar 2019.
- **“The Search for Gravitational Waves”**
60-minute public talk. Maidenhead Astronomical Society, 1 Sep 2017.
- **“An Introduction to Gravity”**
30-minute public talk. Maidenhead Astronomical Society for BBC Stargazing Live, 1 Apr 2017.
- **“Gravitational Wave Astronomy: The Beginning of a New Era”**
30-minute public talk. Maidenhead Astronomical Society, 1 Apr 2016.