

# Martin Dyer – Curriculum Vitae

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## Education

**2015-present** **Doctor of Philosophy** in Astronomy - Expected (submission by 30 Sep 2019)  
UNIVERSITY OF SHEFFIELD, SHEFFIELD, UK  
Supervisors: Prof V. S. Dhillon and Dr E. Daw  
Expected thesis title: *A telescope control and scheduling system for the Gravitational-wave Optical Transient Observer*

**2011-2015** **Master of Physics** in Physics and Astronomy - Class II Division 1 (Honours)  
DURHAM UNIVERSITY, DURHAM, UK  
Final year supervisors: Dr R. W. Wilson and Dr T. Butterley  
Final year project title: *The Durham Optical Transit Telescope: Development of the hardware, building the data pipeline and the first observations*

## Research Experience

**2015-present** **PhD Researcher**  
UNIVERSITY OF SHEFFIELD, SHEFFIELD, UK  
I worked as part of the Gravitational-wave Optical Transient Observer (GOTO) project to build a new wide-field, robotic survey telescope on La Palma, Canary Islands.

- Developed a system 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 built my own pieces of hardware to interface with the dome daemon and monitor internal conditions.

**2016-present** **Core member** of the ULTRACAM team  
UNIVERSITY OF SHEFFIELD, SHEFFIELD, UK  
I have assisted as an observer on multiple runs with three different instruments: ULTRASPEC on the Thai National Telescope in Thailand (Jan 2016), ULTRACAM on the New Technology Telescope at La Silla, Chile (Mar 2018, Oct 2018) and HiPERCAM on the Gran Telescopio Canarias on La Palma, Spain (Oct-Nov 2018).

- Operated each instrument during the nightly observing runs.
- 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-present** **Co-founder and organiser** of Astronomy post-graduate coding collaboration meetings  
UNIVERSITY OF SHEFFIELD, SHEFFIELD, UK  
I helped found a code review and collaboration society within the Astronomy group for PhD students and post-docs, taking over as leader in 2018.
- Organised fortnightly sessions which involved volunteers demonstrating code, giving presentations or asking for advice on particular problems.
  - Presented talks on coding-related subjects such as using Git and GitHub, code editors, style guides and demonstrations of Python modules or features.
  - Coordinated small group projects spanning multiple sessions as a way to practice coding.
- 2016-2018** **Teaching Assistant** for third year Physical Computing module  
UNIVERSITY OF SHEFFIELD, SHEFFIELD, UK  
I worked as a Teaching Assistant for my supervisor's new Physical Computing 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 programming assessments and provided feedback to students.
  - Marked class quizzes and final group reports.
- 2015-2016** **Teaching Assistant** for first year Laboratory and Professional Skills module  
UNIVERSITY OF SHEFFIELD, SHEFFIELD, UK  
I worked as a Teaching Assistant in the undergraduate physics laboratories during my first year.
- 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,  $\text{\LaTeX}$ .
- **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.

## Awards and prizes

- **Royal Astronomical Society Best Poster Award** for the best student poster at the 2018 European Week of Astronomy and Space Science 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

- **“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/mnrasl/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

- **“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 at 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

- **“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 2017, 1 Apr 2017.
- **“Gravitational Wave Astronomy: The Beginning of a New Era”**  
30-minute public talk. Maidenhead Astronomical Society, 1 Apr 2016.