

# Dr. Laura Prichard

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Space Telescope Science Institute,  
3700 San Martin Drive,  
Baltimore, MD 21218, USA  
✉ [lprichard@stsci.edu](mailto:lprichard@stsci.edu)

🌐 [lauraprichard.co.uk](http://lauraprichard.co.uk)  
🔗 [github.com/lprichard](https://github.com/lprichard)  
☎ +1 (410) 972-8881  
ORCID: [0000-0002-0604-654X](https://orcid.org/0000-0002-0604-654X)

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## Profile

Independent researcher with a diverse scientific background, looking for a long-term technical position. Strong problem solving, coding, data analysis, pipeline development, collaboration and leadership skills.

## Employment

- **Space Telescope Science Institute (STScI)**, September 2018–present.
  - Postdoctoral Researcher. Supervisor: Dr. Marc Rafelski.

## Education

- **University of Oxford, UK**, October 2014–June 2018.
  - Doctor of Philosophy (DPhil) in Astrophysics, awarded June 2018.
  - *Doctoral Researcher Honourable Mention Award*, Doctoral Researcher Awards, 2018.
  - *Hintze Scholarship*, for future leaders in astronomy, University of Oxford, 2014–2018.
  - Supervisor: Prof. Roger Davies.
- **University of Leeds, UK**, 2010–2014.
  - Master of Physics (MPhys) with Astronomy (North America) & Bachelor of Science (BSc), *first class honors*.
  - *Bolton Prize in Astrophysics*, for top graduating student, University of Leeds, 2014.
  - MPhys Supervisors: Prof. Paola Caselli & Prof. Raja Guhathakurta (UCSC).
- **University of California, Santa Cruz (UCSC), CA, USA**, 2012–2013.
  - Exchange year for BSc/MPhys. Formed research collaboration for MPhys project.

## Technical Skills

- **Pipeline Development**
  - ***Hubble Space Telescope (HST) Wide Field Camera 3 (WFC3)/UVIS darks***
    - \* Starting from the STScI WFC3/UVIS darks pipeline, redesigned the file and code structure to run independently of access to proprietary data.
    - \* Tested versions of a new charge transfer efficiency (CTE) code developed by STScI and its effects on the outputs.
    - \* Implemented the use of concurrent darks (using pixel replacement from the same anneal cycle) for creating superdark files to correct the data.
    - \* Developed a novel method for uniformly flagging hot pixels after CTE degradation by applying a variable threshold that increased the number detected by  $\sim 30\%$ .
    - \* *All improvements to the WFC3/UVIS darks pipeline have been adopted by the WFC3 team for future delivered data products.*
    - \* Worked with members of the WFC3 team to bring their pipeline in line with my own and ran testing of the pipeline improvements on science drizzles.
    - \* Implemented and tested additional corrections (written by Ben Sunnquist) to the reduced data files to remove residual artifacts created by the new CTE code.

- **K-band Multi-Object Spectrograph (KMOS) integral field unit (IFU)**
  - \* Developed a pipeline (prior to an official one) for KMOS IFU and mosaic data.
  - \* Combined ESOREX functions (dark, flat, wavelength, illumination corrections, first-order sky subtractions) in shell script wrapper with file organization. Created custom noise cubes. Performed additional sky subtraction with MOLECFIT.
- **Data Reduction**
  - Reduction of raw WFC3/UVIS darks for 16 anneal cycles and data for several HST programs: UVCANDELS (PID 15647), 164 orbits; Lyman continuum galaxies (PID 15100), 30 orbits; MUSE Ultra Deep Field (MUDF; PID 15968), 8 orbits; Damped Ly- $\alpha$  Systems (PID 15416), 8 orbits.
  - Extensive use of `DrizzlePac` for combining UV to IR HST images: WFC3/F336W & F814W & F105W & F160W, ACS/F435W, several programs.
  - Reduction of KMOS commissioning data using my custom pipeline. Utilizing a collaborator's pipeline for creating individual spectra binned across 20-hour observations.
- **Data Analysis**
  - Fluent in Python for a wide variety of data reduction, analysis methods, and plotting.
  - IFU cube calibration, normalization, manipulation, analysis, and visualization.
  - Spectral-line fitting for 1D spectra and IFU cubes with my own scripts and `PPXF`.
  - Photometric fits and parameter derivation with `GALAPAGOS`, `SExtractor`, `photutils`.
- **Software**
  - **Computer languages**
    - \* Fluent: Python/iPython, IDL, shell script.
    - \* Familiar: C/C++, HTML, IRAF, SQL.
  - **Software/packages**
    - \* `astropy`, `DrizzlePac`, `EMACS`, `ESOREX`, `EzGAL`, `GALAPAGOS`, `GALFIT`, `KARMA`, `LATEX`, Microsoft Office, `MOLECFIT`, `pandas`, `photutils`, `PPXF`, `SExtractor`, Starlink (`GAIA`), `VORONOI_2D_BINNING`. Familiar: `APT`.

## Proposals & Grants

- **NASA Keck**
  - Principal Investigator (PI) for 1.5n on LRIS (proposal ID: 2020B\_N168), \$15,650 PI data award, awarded June 2020.
  - Co-Investigator (Co-I) for 1.5n on LRIS (PID: 2019B\_N010), awarded May 2019.
- **Large Binocular Telescope (LBT)**
  - PI for 1.5n on LBT-SVC MODS1 (PID: 2019B-0448), awarded June 2019.
- **Hubble Space Telescope**
  - Co-I for 8 orbits WFC3/UVIS F336W (PID: 15968, Cycle27), awarded July 2019.
  - Co-I for 90 orbits WFC3/G141 grism (PID: 15637, Cycle26), awarded November 2018.
- **European Southern Observatory (ESO)**
  - Co-PI for 3n on KMOS (PID: 0100.A-0296(A)), awarded July 2017.
- **Travel Grants**
  - Royal Astronomical Society, £680 & £563, awarded August 2015 & January 2018.
  - Christ Church, Oxford, £600 & £100, awarded August 2015 & April 2016.
  - International Astronomical Union, \$780, awarded August 2015.

## Observing Experience

### • Keck Observatory, HI, USA

- Visitor mode, LRIS multi-slit spectrograph, 2018B\_N188 & 2019B\_N010, December & January 2018–2020.
- Remote, ESI spectrograph, April 2019.
- Visitor mode, DEIMOS multi-slit spectrograph, April 2013.

### • European Southern Observatory, Chile

- Visitor mode, VLT/KMOS NIR multi-IFU, 099.A-0207(A), April 2017; 098.A-0224(A) & 098.A-0204(A)(B), October 2016; 095.B-0035(C), August 2015.

## Research Achievements

### • 3 first author publications

- *‘Unravelling the Origin of the Counter-Rotating Core in IC 1459 with KMOS and MUSE’*, September 2019, MNRAS, 488-2, 1679–1694.
  - \* Combined KMOS and MUSE cubes into 1 arcmin<sup>2</sup> optical-NIR view of galaxy.
  - \* Measured radial trends in stellar properties and initial mass function from spectroscopic features, first time for a galaxy with a counter-rotating core.
- *‘The KMOS Cluster Survey (KCS) III: fundamental plane of cluster galaxies at  $z \simeq 1.80$  in JKCS 041’*, December 2017, ApJ, 850, 203.
  - \* International collaboration (Oxford, UK & MPE, Germany & Durham, UK).
  - \* Reduced deep 20-hour KMOS observations and ancillary HST photometry.
  - \* Spectral-line and photometric fits of galaxies led to the discovery of a younger, in-falling population of cluster galaxies for the first time at this distance.
- *‘Emission-line stars in M31 from the SPLASH and PHAT surveys’*, March 2017, MNRAS, 465, 4180–4203.
  - \* Formed a collaboration between University of Leeds, UK and UCSC, USA.
  - \* Utilized 6-filter Panchromatic Hubble Andromeda Treasury (PHAT) and Keck/DEIMOS data to characterize and analyze emission-line stars in M31.

### • 2 first author publications in preparation

- *‘Lyman continuum galaxies (LCGs) in COSMOS’*
  - \* International collaboration between STScI & Swinburne University, Australia.
  - \* Will detail the WFC3/UVIS reduction improvements.
  - \* Identifying LCGs in UV HST images and confirming with Keck spectroscopy.
- *‘LCGs in COSMOS from UVCANDELS’*
  - \* Reduced all UVCANDELS data (164 orbits) using my custom WFC3 pipeline.
  - \* Expanding LCG search with established methodology in UVCANDELS imaging and upcoming Keck/LRIS time for spectroscopic redshift confirmation.

### • 9 co-author publications, including papers within the LCGs, MUDF, K-CLASH, and KCS international collaborations.

### • 21 international science talks & 3 poster presentations, including colloquia, conference contributions, and journal clubs.

## Leadership & Committee Roles

- **Inclusive Astronomy 2 Local Organizing Committee (LOC)**, April 2019–July 2020.
  - Co-chair of LOC. Oversaw designing and implementing new meeting policies to hold an accessible meeting for advancing diversity, equity & inclusion (DEI) in astronomy.
  - Used lessons learned to publish comprehensive recommendations for STScI and the astronomy community to plan future inclusive conferences. [arXiv:2007.10970](https://arxiv.org/abs/2007.10970).
  - The IA2 LOC received an *STScI DEI Award* in September 2020 for this work.
- **Women in Astronomy Forum initiative**, November 2018–September 2019.
  - Led survey of STScI science staff to determine factors affecting conference attendance.
  - Published [Astro2020 white paper](#). Presented recommendations to STScI leadership.
- **Invision Working Group, STScI**, November 2018–2020.
  - Elected member, actively engaged in DEI initiatives to support STScI staff.
  - Co-created the STScI Outreach Mentor Program.
  - Presented recommendations for improving DEI structural support to leadership team.
- **Service at STScI**
  - Spectroscopy intern hiring committee, August–September 2020.
  - HST time allocation committee panel support, May 2019.
  - JHU/STScI Science Jamboree organizer, March–May 2019.
  - Galaxy Journal Club organizer, February–June 2019.
  - Postdoc hiring committee, January–February 2019.
  - Postdoc representative, November 2018–August 2019.
  - CoolSci organizer, October 2018–January 2019.
  - Friday Science Coffee organizer, October 2018–February 2019.
- **President, Christ Church Graduate Common Room (GCR)**, March 2015–2016.
  - Representing University of Oxford, Christ Church graduates college- and university-wide. Managing a committee of 30 people. Implementing policies, reforming the GCR constitution, and campaigning for the inclusion of underrepresented students.
- **Events Coordinator, Oxford Women in Physics Society**, January–October 2015.
- **LOCs: HARMONI**, Oxford, June 2015; **Wetton Workshop**, Oxford, April 2015.

## Supervision & Mentoring

- **Maria Mitchell Observatory (MMO)**, Affiliated Astronomer. Supervising and mentoring an undergraduate intern on a research project and paper in prep., May 2019–present.
- **UCSC**, Mentor, Summer Internship Program. Co-supervising three high-school students on a research project, made co-authors on my paper, Siemens award semifinalists, June–September 2016.
- **University of Oxford**, Tutor for six master’s students, MPhys C1 Astrophysics Course, October 2015–June 2016.

## Outreach & Press

- **Outreach**
  - Astronomy on Tap (AoT) organizer, January–June 2019.
  - 4 public talks: [STScI Public Lecture](#), MMO in Nantucket, AoT, Christ Church.
  - Stargazing annual event, Oxford, 2015–2017.
  - Telescope Evenings, Oxford, 2014–2015.
- **Press**
  - Interviewed for an [article](#) in Yesterday’s Island, Nantucket, MA, USA, June 2019.
  - Interviewed for an [article](#) in Independent on Sunday, UK, March 2015.

**References****Doctor Marc Rafelski***Postdoc supervisor*

Space Telescope Science Institute,  
3700 San Martin Drive,  
Baltimore, MD 21218, USA  
[mrafelski@stsci.edu](mailto:mrafelski@stsci.edu)

**Professor Roger Davies***DPhil supervisor*

Sub-Department of Astrophysics,  
University of Oxford,  
OX1 3RH, UK  
[roger.davies@physics.ox.ac.uk](mailto:roger.davies@physics.ox.ac.uk)

**Associate Professor Jeff Cooke***Collaborator*

Centre for Astrophysics & Supercomputing,  
Swinburne University of Technology,  
VIC 3122, Australia  
[jcooke@astro.swin.edu.au](mailto:jcooke@astro.swin.edu.au)