

# Charlotte Mason

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<b>Research Interests</b>	Hydrogen reionization; high redshift galaxy formation and evolution; evolution of the intergalactic medium; dark matter; Lyman- $\alpha$ emission; 21-cm signal; gravitational lensing; Bayesian statistics	
<b>Academic Employment</b>	<b>Associate Professor</b> of Extragalactic Astrophysics Cosmic Dawn Center, Niels Bohr Institute, University of Copenhagen, Denmark	2021 –
	<b>NASA Hubble Fellow &amp; CfA Fellow</b> Center for Astrophysics   Harvard & Smithsonian, Cambridge, MA, USA	2018 – 2021
<b>Education</b>	2015 – 2018   <b>Doctor of Philosophy (PhD)</b> in Astronomy <i>University of California, Los Angeles, California, USA</i> Thesis: “Galaxies at the Epoch of Cosmic Reionization” Advisor: Prof. Tommaso Treu	
	2013 – 2015   <b>Master of Arts (MA)</b> in Physics, with Astrophysics Emphasis <i>University of California, Santa Barbara, California, USA</i>	
	2009 – 2013   <b>Master of Physics (MPhys)</b> , 4 Year Undergraduate Honours Degree <i>Merton College, University of Oxford, Oxford, UK</i> Thesis: “High-Redshift Disk Formation” Supervisors: Dr. Julien Devriendt & Dr. Adrienne Slyz	
<b>Honours, Fellowships, and Awards</b>	Villum Young Investigator Award, 2021 NASA Hubble Fellowship, 2018 CfA Fellowship, <i>Harvard-Smithsonian Center for Astrophysics</i> , 2018 Rodger Doxsey Prize, AAS, 2018 Dr. Pliny A. and Margaret H. Price Prize in Cosmology and AstroParticle Physics, <i>CCAPP, Ohio State University</i> , 2017 NASA Earth and Space Science Fellowship (NESSF), 2016 – 2018 Chair’s Outstanding Service Award, <i>Physics Department, UC Santa Barbara</i> , 2015 Yzurdiaga Graduate Fellowship, <i>UC Santa Barbara</i> , 2013 Broida Fellowship, <i>Physics Department, UC Santa Barbara</i> Fowler Prize for Achievement, 4 times, <i>Merton College, University of Oxford</i> , 2009 – 2013 Exhibition (Prize Scholarship), <i>Merton College, University of Oxford</i> , 2012 Summer Undergraduate Research Fellowship, <i>California Institute of Technology</i> , 2011 Scholar, International Summer School for Young Physicists, <i>Perimeter Institute</i> , 2008	
<b>Publications</b>	Total of 41 published peer reviewed and 1 submitted journal articles, including 8 as first author. 594 first author paper citations, 1604 total citations. h index of 21 (ADS 2022-04-13).	
<b>Invited Talks and Lectures</b>	27. Uppsala University, Sweden, 2022 (upcoming) 26. Imperial College London, UK, 2022 25. University of Hertfordshire, UK, 2022 24. Niels Bohr Institute, University of Copenhagen, Denmark, 2021 23. UCLA, USA, 2021 22. Kathmandu Astrophysics School, Nepal, 2020	Seminar Seminar Seminar Tenure Lecture Colloquium Lecture

21. University of Arizona, USA, 2020	Seminar
20. Cosmic Dawn Center, University of Copenhagen, Denmark, 2020	Seminar
19. University of Sussex, UK, 2020	Colloquium
18. Institute for Cosmology and Gravitation, Portsmouth, UK, 2020	Colloquium
17. Lancaster University, UK, 2020	Seminar
16. University of Minnesota, USA, 2020	Colloquium
15. UT Austin, USA, 2019	Colloquium
14. Tufts University, USA, 2019	Seminar
13. University of Michigan, USA, 2019	Colloquium
12. University of Melbourne, Australia, 2019	Colloquium
11. CITA, Canada, 2019	Seminar
10. McGill Space Institute, Canada, 2018	Seminar
9. University of Connecticut, USA, 2018	Seminar
8. Harvard-Smithsonian CfA, USA, 2018	Seminar
7. UC Berkeley, USA, 2017	Seminar
6. KIPAC, Stanford University, USA, 2017	Seminar
5. UC Santa Barbara, USA, 2017	Seminar
4. CCAPP, Ohio State University, USA, 2017	Seminar
3. University of Oxford, UK, 2016	Seminar
2. UC Davis, USA, 2016	Seminar
1. Institute for Cosmology and Gravitation, Portsmouth, UK, 2015	Seminar

### Conference Talks

19. Reionization and Cosmic Dawn, Berkeley, CA, 2022 (cancelled due to illness)	Invited Talk
18. Early Growth of Galaxies, Sexten CfA, Italy, 2022	Invited Review
17. SAZERAC: Learning the high-redshift Universe, online, 2022	Invited Review
16. DAWN Summit, Copenhagen, DK, 2021	Invited Review
15. Cosmology From Home, online, 2021	
14. EAS Symposium: Panchromatic and hyper-spectral observations of Cluster Lenses and Lensed Galaxies, online, 2020	Invited Talk
13. Early Growth of Galaxies, Sexten Center for Astrophysics, Italy, 2020	Invited Talk
12. Barefoot EoR, Fitzroy Island, Australia, 2019	
11. Big Eyes on the Early Universe, Los Angeles, CA, 2019	
10. Early Growth of Galaxies, Sexten Center for Astrophysics, Italy, 2019	Invited Talk
9. KMOS@5, ESO, Garching, Germany, 2018	Invited Talk
8. Early Growth of Galaxies, Sexten Center for Astrophysics, Italy, 2018	Invited Talk
7. AAS 231, Washington DC, 2018	Dissertation Talk
6. Cosmic Dawn with JWST, STScI, Baltimore, MD, 2017	
5. EWASS SS15: Unravelling the First Billion Years, Prague, CZ, 2017	
4. Physical Characteristics of Normal Galaxies at $z > 2$ , Leiden, NL, 2016	
3. Galaxy Workshop, UC Santa Cruz, CA, 2016	
2. The Reionization Epoch, Aspen Center for Physics, Aspen, CO, 2016	
1. Early Growth of Galaxies, Sexten Center for Astrophysics, Italy, 2016	Invited Talk
0. First Light & Cosmology, Institut Astrophysique de Paris, France, 2015	

### Advising and Teaching Experience

#### PhD Students

- Ting-Yi Lu (University of Copenhagen), 2021-  
Primary supervisor.
- Gonzalo Prieto Lyon (University of Copenhagen), 2021-  
Primary supervisor.
- Rohan Naidu (Harvard), 2018-2020  
Co-supervisor for projects related to reionization. 2 papers published.

#### Undergraduate Students

- Alexa Morales (Florida International University → UT Austin, PhD student)  
Supervisor for SAO Summer REU program, 2020.  
1 published paper: Morales, Mason, et al. 2021. ApJ, 919, 120.
- Lily Whitler (Arizona State University → University of Arizona, NSF Graduate Research Fellow)

Supervisor for SAO Summer REU program, 2019.  
1 published paper: Whittler, Mason, et al., 2020. MNRAS, 495, 3602.

### Examinations

- PhD defense committee: Lukas Furtak (Sorbonne Université, France)

### Teaching

- Guest Lecturer: Extragalactic Astrophysics. University of Copenhagen 2021.
- Primary Instructor: *Astronomy Lab*, 2015–2017. Interactive class taught in a planetarium and observatory. As Adjunct Faculty, Earth & Planetary Science Department, Santa Barbara City College
- Teaching Assistant: *Quantum Mechanics, Physics 1 - Classical Mechanics* for non-Physics student. Physics Department, UCSB

### Training in teaching and mentorship

- PhD Supervision course, University of Copenhagen, 2021
- The Science of Teaching Science course, Harvard University, 2021
- Certificate in Undergraduate Mentoring in Science Education, Harvard University, 2020
- AAS Astronomy Ambassador, 2018

### Approved Observing Proposals (PI)

2. MMT/Binospec 2019-2020: Unraveling Reionization with Resolved Lyman Alpha (15.5 nights)
1. Magellan/FIRE 2020: The Evolution of Super Massive Black Holes in the First Billion Years (2 nights)

### Approved Observing Proposals (CoI)

JWST (1 ERS program – PI Treu, 4 GO programs – PIs: Dunlop, Malkan, Oesch, Roberts-Borsani), HST (4 GO programs – PIs: Treu, Trenti, 2 archival programs – PIs: Bradač, Morishita), Spitzer (1 program – PI: Bouwens), ESO (3 programs – PIs: Fontana, Sanchez-Janssen, Hayes), MMT (1 program – PI: Tacchella)

### Professional Service

- Chair of DAWN Fellowship committee, 2022
- Member of DAWN Fellowship and PhD selection committee, 2021
- Conference organizing – SOC: SAZERAC virtual conference, 2020, 2021
- Seminar organizing: DAWN Cake talks, CfA High Redshift Galaxy Evolution Meeting, CfA Galaxies & Cosmology Seminar, UCSB Astrophysics Colloquia
- Grant reviewing: NSF Astronomy and Astrophysics Grants, NASA Astrophysics Data Analysis Program, NASA FINESST graduate fellowship
- Journal referee: ApJ, MNRAS, A&A
- Software tester for STScI JWST Data Analysis Development Forum

### Outreach, Media and DEI

- Media:
  - TV: BBC/PBS NOVA "Universe" contributor
  - Radio: NPR "All Things Considered" JWST + first galaxies
- Contributor to NHFP Anti-Racism Initiative <https://www.nhfp-equity.org>
- NASA Universe of Learning Subject Matter Expert
- AAS Astronomy Ambassador
- Volunteer at Cambridge Explores the Universe
- Virtual classroom visits with YouthAstroNet
- Host and speaker at Astronomy on Tap, Santa Barbara and Boston.
- Invited Public Talks at Santa Barbara City College, Santa Barbara Salon, Santa Barbara Astronomical Unit and Merton College, Oxford
- Committee member of UCSB Women in Physics group
- Started a mentorship program for women in STEM at Oxford University

## Publication List

PhD students directly under my supervision are marked with †, BSc and MSc students are marked with \*

### First author publications

10. \*Morales, A. M., et al. The Evolution of the Lyman-alpha Luminosity Function during Reionization. [ApJ, 919, 2:120, 2021.](#)
9. Mason, C. A. and Gronke, M. Measuring the properties of reionized bubbles with resolved Ly $\alpha$  spectra. [MNRAS, 499, 1:1395–1405, 2020.](#)
8. \*Whitler, L. R., et al. The impact of scatter in the galaxy UV luminosity to halo mass relation on Ly $\alpha$  visibility during the epoch of reionization. [MNRAS, 495, 4:3602–3613, 2020.](#)
7. Mason, C. A., et al. Model-independent constraints on the hydrogen-ionizing emissivity at  $z > 6$ . [MNRAS, 489, 2:2669–2676, 2019.](#)
6. Mason, C. A., et al. Inferences on the timeline of reionization at  $z \sim 8$  from the KMOS Lens-Amplified Spectroscopic Survey. [MNRAS, 485, 3:3947–3969, 2019.](#)
5. Mason, C. A., et al. Beacons into the Cosmic Dark Ages: Boosted Transmission of Ly $\alpha$  from UV Bright Galaxies at  $z \gtrsim 7$ . [ApJ, 857, 2:L11, 2018.](#)
4. Mason, C. A., et al. The Universe Is Reionizing at  $z \sim 7$ : Bayesian Inference of the IGM Neutral Fraction Using Ly $\alpha$  Emission from Galaxies. [ApJ, 856, 1:2, 2018.](#)
3. Mason, C. A., et al. First Results from the KMOS Lens-Amplified Spectroscopic Survey (KLASS): Kinematics of Lensed Galaxies at Cosmic Noon. [ApJ, 838, 1:14, 2017.](#)
2. Mason, C. A., Trenti, M., and Treu, T. The Galaxy UV Luminosity Function before the Epoch of Reionization. [ApJ, 813, 1:21, 2015.](#)
1. Mason, C. A., et al. Correcting the  $z \sim 8$  Galaxy Luminosity Function for Gravitational Lensing Magnification Bias. [ApJ, 805, 1:79, 2015.](#)

### Contributing author publications

32. Muñoz, J. B., et al. The impact of the first galaxies on cosmic dawn and reionization. [MNRAS, 511, 3:3657–3681, 2022.](#)
31. Valentino, F., et al. The archival discovery of a strong Lyman- $\alpha$  and [CII] emitter at  $z = 7.677$ . arXiv e-prints, arXiv:2203.03657, 2022.
30. Gronke, M., et al. Lyman- $\alpha$  transmission properties of the intergalactic medium in the CoDall simulation. [MNRAS, 508, 3:3697–3709, 2021.](#)
29. Bolan, P., et al. Inferring the IGM Neutral Fraction at  $z \sim 6 - 8$  with Low-Luminosity Lyman Break Galaxies. arXiv e-prints, arXiv:2111.14912, 2021.
28. Lemaux, B. C., et al. The size and pervasiveness of Ly $\alpha$ -UV spatial offsets in star-forming galaxies at  $z \sim 6$ . [MNRAS, 504, 3:3662–3681, 2021.](#)
27. Roberts-Borsani, G., et al. Improving  $z \sim 7 - 11$  Galaxy Property Estimates with JWST/NIRCam Medium-band Photometry. [ApJ, 910, 2:86, 2021.](#)
26. Pelliccia, D., et al. RELICS-DP7: Spectroscopic Confirmation of a Dichromatic Primeval Galaxy at  $z \sim 7$ . [ApJ, 908, 2:L30, 2021.](#)
25. Morishita, T., et al. SuperBoRG: Exploration of Point Sources at  $z \sim 8$  in HST Parallel Fields. [ApJ, 904, 1:50, 2020.](#)
24. Mirocha, J., Mason, C., and Stark, D. P. Effects of self-consistent rest-ultraviolet colours in semi-empirical galaxy formation models. [MNRAS, 498, 2:2645–2661, 2020.](#)
23. Girard, M., et al. The KMOS Lens-Amplified Spectroscopic Survey (KLASS): kinematics and clumpiness of low-mass galaxies at cosmic noon. [MNRAS, 497, 1:173–191, 2020.](#)
22. Fuller, S., et al. Spectroscopically Confirmed Ly $\alpha$  Emitters from Redshift 5 to 7 behind 10 Galaxy Cluster Lenses. [ApJ, 896, 2:156, 2020.](#)
21. Naidu, R. P., et al. Rapid Reionization by the Oligarchs: The Case for Massive, UV-bright, Star-forming Galaxies with High Escape Fractions. [ApJ, 892, 2:109, 2020.](#)
20. Bradač, M., et al. Hubble Frontier Field photometric catalogues of Abell 370 and RXC J2248.7-4431: multiwavelength photometry, photometric redshifts, and stellar properties. [MNRAS, 489, 1:99–107, 2019.](#)
19. Hoag, A., et al. Constraining Lyman-alpha spatial offsets at  $3 < z < 5.5$  from VANDELS slit spectroscopy. [MNRAS, 488, 1:706–719, 2019.](#)
18. Hoag, A., et al. Constraining the Neutral Fraction of Hydrogen in the IGM at Redshift 7.5. [ApJ, 878, 1:12, 2019.](#)
17. Ren, K., Trenti, M., and Mason, C. A. The Brightest Galaxies at Cosmic Dawn from Scatter in the Galaxy Luminosity versus Halo Mass Relation. [ApJ, 878, 2:114, 2019.](#)

16. Morishita, T., et al. The Bright-end Galaxy Candidates at  $z \sim 9$  from 79 Independent HST Fields. [ApJ, 867, 2:150, 2018.](#)
15. Abramson, L. E., et al. The Grism Lens-amplified Survey from Space (GLASS). XII. Spatially Resolved Galaxy Star Formation Histories and True Evolutionary Paths at  $z > 1$ . [AJ, 156, 1:29, 2018.](#)
14. Livermore, R. C., et al. HST Follow-up Observations of Two Bright  $z \sim 8$  Candidate Galaxies from the BoRG Pure-parallel Survey. [ApJ, 861, 2:L17, 2018.](#)
13. Finney, E. Q., et al. Mass Modeling of Frontier Fields Cluster MACS J1149.5+2223 Using Strong and Weak Lensing. [ApJ, 859, 1:58, 2018.](#)
12. Hoag, A., et al. HST Grism Observations of a Gravitationally Lensed Redshift 9.5 Galaxy. [ApJ, 854, 1:39, 2018.](#)
11. Schmidt, K. B., et al. The Grism Lens-Amplified Survey from Space (GLASS). XI. Detection of CIV in Multiple Images of the  $z = 6.11$  Ly $\alpha$  Emitter behind RXC J2248.7-4431. [ApJ, 839, 1:17, 2017.](#)
10. Hoag, A., et al. Spectroscopic confirmation of an ultra-faint galaxy at the epoch of reionization. [Nature Astronomy, 1:0091, 2017.](#)
9. Wang, X., et al. The Grism Lens-amplified Survey from Space (GLASS). X. Sub-kiloparsec Resolution Gas-phase Metallicity Maps at Cosmic Noon behind the Hubble Frontier Fields Cluster MACS1149.6+2223. [ApJ, 837, 1:89, 2017.](#)
8. Santini, P., et al. Characterizing elusive, faint dusty star-forming galaxies: a lensed, optically undetected ALMA galaxy at  $z = 3.3$ . [A&A, 596:A75, 2016.](#)
7. Bernard, S. R., et al. Galaxy Candidates at  $z \sim 10$  in Archival Data from the Brightest of Reionizing Galaxies (BORG[z8]) Survey. [ApJ, 827, 1:76, 2016.](#)
6. Agnello, A., et al. Spectroscopy and high-resolution imaging of the gravitational lens SDSS J1206+4332. [MNRAS, 458, 4:3830-3838, 2016.](#)
5. Huang, K.-H., et al. Detection of Lyman-alpha Emission from a Triply Imaged  $z = 6.85$  Galaxy behind MACS J2129.4-0741. [ApJ, 823, 1:L14, 2016.](#)
4. Schmidt, K. B., et al. The Grism Lens-Amplified Survey from Space (GLASS). III. A Census of Ly $\alpha$  Emission at  $z \gtrsim 7$  from HST Spectroscopy. [ApJ, 818, 1:38, 2016.](#)
3. Calvi, V., et al. Bright Galaxies at Hubble's Redshift Detection Frontier: Preliminary Results and Design from the Redshift  $z \sim 9-10$  BoRG Pure-Parallel HST Survey. [ApJ, 817, 2:120, 2016.](#)
2. Treu, T., et al. The Grism Lens-Amplified Survey from Space (GLASS). I. Survey Overview and First Data Release. [ApJ, 812, 2:114, 2015.](#)
1. Schmidt, K. B., et al. Through the Looking GLASS: HST Spectroscopy of Faint Galaxies Lensed by the Frontier Fields Cluster MACSJ0717.5+3745. [ApJ, 782, 2:L36, 2014.](#)