

# FREDERICK B. DAVIES

## PERSONAL INFORMATION

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## EDUCATION

*PhD in Astronomy*            2010-2015        University of California, Los Angeles  
Advisor: Dr. Steven Furlanetto  
"Self-consistent Modeling of the Intergalactic Ionizing Radiation Field Across Cosmic Time"  
Degree conferred: 11 Sep 2015

*Bachelor of Science in Physics*    2006-2010        New Mexico Institute of Mining & Technology  
Astrophysics Concentration · Summa Cum Laude

## ACADEMIC POSITIONS

*Group Leader*            2020-present     Max-Planck-Institut für Astronomie  
Galaxies & Cosmology Department, Heidelberg, Baden-Württemberg, Germany

*Postdoctoral Scholar*        2019-2020        Lawrence Berkeley National Laboratory  
Computational Research Division, Berkeley, California, USA

*Postdoctoral Scholar*        2017-2019        University of California, Santa Barbara  
Physics Department, Santa Barbara, California, USA

*Postdoctoral Fellow*        2015-2017        Max-Planck-Institut für Astronomie  
Galaxies & Cosmology Department, Heidelberg, Baden-Württemberg, Germany

## PUBLICATIONS

- First Author Publications*
1. **Davies, F. B.**, Wang, F., Eilers, A.-C., Hennawi, J. F., "Constraining the Gravitational Lensing of  $z \gtrsim 6$  Quasars from their Proximity Zones", *ApJL*, in press ([arXiv:2007.15657](https://arxiv.org/abs/2007.15657))
  2. **Davies, F. B.**, "Ionization bias and the ghost proximity effect near  $z \gtrsim 6$  quasars in the shadow of proximate absorption systems", *MNRAS*, 494, 2937
  3. **Davies, F. B.**, Hennawi, J. F., Eilers, A.-C., "Time-dependent behaviour of quasar proximity zones at  $z \sim 6$ ", 2020, *MNRAS*, 493, 1330
  4. **Davies, F. B.**, Hennawi, J. F., Eilers, A.-C., "Evidence for Low Radiative Efficiency or Highly Obscured Growth of  $z > 7$  Quasars", 2019, *ApJL*, 884, L19
  5. **Davies, F. B.** et al., "Quantitative Constraints on the Reionization History from the IGM Damping Wing Signature in Two Quasars at  $z > 7$ ", 2018, *ApJ*, 864, 142
  6. **Davies, F. B.** et al., "Predicting Quasar Continua Near Lyman- $\alpha$  with Principal Component Analysis", 2018, *ApJ*, 864, 143
  7. **Davies, F. B.**, Becker, G. D., Furlanetto, S. R., "Determining The Nature of Late Gunn-Peterson Troughs with Galaxy Surveys", 2018, *ApJ*, 860, 155
  8. **Davies, F. B.**, Hennawi, J. F., Eilers, A.-C., Lukić, Z., "A New Method to Measure the Post-Reionization Ionizing Background from the Joint Distribution of Lyman- $\alpha$  and Lyman- $\beta$  Forest Transmission", 2018, *ApJ*, 855, 106
  9. **Davies, F. B.**, Furlanetto, S. R., Dixon, K. L., "A self-consistent 3D model of fluctuations in the helium-ionizing background", 2017, *MNRAS*, 465, 2886
  10. **Davies, F. B.**, Furlanetto, S. R., "Large fluctuations in the hydrogen-ionizing background and mean free path following the epoch of reionization", 2016, *MNRAS*, 460, 1328

First Author  
Publications  
(continued)

11. **Davies, F. B.**, Furlanetto, S. R., McQuinn, M., “Quasar ionization front Ly $\alpha$  emission in an inhomogeneous intergalactic medium”, 2016, *MNRAS*, 457, 3006

12. **Davies, F. B.**, Furlanetto, S. R., “The effect of fluctuations on the helium-ionizing background”, 2014, *MNRAS*, 437, 1141

Co-author  
Publications

13. Schindler, J.-T., **Davies, F. B.** et al., “The X-SHOOTER/ALMA sample of Quasars in the Epoch of Reionization. I. NIR spectral modeling, iron enrichment and broad emission line properties”, 2020, *ApJ*, in press (arXiv:2010.06902)

14. Hennawi, J. F., **Davies, F. B.**, Wang, F., Oñorbe, J., “Probing Reionization and Early Cosmic Enrichment with the MgII Forest”, 2020, submitted to *MNRAS* (arXiv:2007.15747)

15. Bosman, S. E. I., Āurovčíková, D., **Davies, F. B.**, Eilers, A.-C., “A comparison of quasar emission reconstruction techniques for  $z \geq 5.0$  Lyman- $\alpha$  and Lyman- $\beta$  transmission”, 2020, submitted to *MNRAS* (arXiv:2006.10744)

16. Prochaska, J. X., ... **Davies, F. B.** et al., “Pypelt: The Python Spectroscopic Data Reduction Pipeline”, 2020, submitted to *JOSS* (arXiv:2005.06505)

17. Yang, J., ... **Davies, F. B.** et al., “Measurements of the  $z \sim 6$  Intergalactic Medium Optical Depth and Transmission Spikes Using a New  $z > 6.3$  Quasar Sample”, 2020, *ApJ*, in press (arXiv:2009.13544)

18. Eilers, A.-C., ... **Davies, F. B.** et al., “Detecting and Characterizing Young Quasars I: Systemic Redshifts and Proximity Zone Measurements”, 2020, *ApJ*, 900, 37

19. Onoue, M., ... **Davies, F. B.** et al., “No Redshift Evolution in the Broad-line-region Metallicity up to  $z = 7.54$ : Deep Near-infrared Spectroscopy of ULAS J1342+0928”, 2020, *ApJ*, 898, 105

20. Yang, J., ... **Davies, F. B.** et al., “Pōniuā'ena: A Luminous  $z = 7.5$  Quasar Hosting a 1.5 Billion Solar Mass Black Hole”, 2020, *ApJL*, 897, 14

21. Wang, F., **Davies, F. B.** et al., “A Significantly Neutral Intergalactic Medium Around the Luminous  $z = 7$  Quasar J0252-0503”, 2020, *ApJ*, 896, 23

22. Āurovčíková, D., ... **Davies, F. B.** et al., “Reionization history constraints from neural network based predictions of high-redshift quasar continua”, 2020, *MNRAS*, 493, 4256

23. Farina, E. P., ... **Davies, F. B.** et al., “The REQUIEM Survey I: A Search for Extended Ly-Alpha Nebular Emission Around 31  $z > 5.7$  Quasars”, 2019, *ApJ*, 887, 196

24. Bañados, E., ... **Davies, F. B.** et al., “A Metal-Poor Damped Ly $\alpha$  System at Redshift 6.4”, 2019, *ApJ*, 885, 59

25. Wang, F., ... **Davies, F. B.** et al., “Exploring Reionization-Era Quasars III: Discovery of 16 Quasars at  $6.4 \lesssim z \lesssim 6.9$  with DESI Legacy Imaging Surveys and UKIRT Hemisphere Survey and Quasar Luminosity Function at  $z \sim 6.7$ ”, 2019, *ApJ*, 884, 30

26. Eilers, A.-C., Hennawi, J. F., **Davies, F. B.**, Oñorbe, J., “Anomaly in the Opacity of the Post-Reionization Intergalactic Medium in the Ly $\alpha$  and Ly $\beta$  Forest”, 2019, *ApJ*, 881, 23

27. Oñorbe, J., **Davies, F. B.**, Lukić, Z., Hennawi, J. F., Sorini, D., “Inhomogeneous Reionization Models in Cosmological Hydrodynamical Simulations”, 2019, *MNRAS*, 486, 4075

28. Worseck, G., **Davies, F. B.**, Hennawi, J. F., Prochaska, J. X., “The Evolution of the HeII-Ionizing Background at Redshifts  $2.3 < z < 3.8$  Inferred from a Statistical Sample of 24 HST/COS HeII Ly $\alpha$  Absorption Spectra”, 2019, *ApJ*, 875, 111

29. D’Aloisio, A., ... **Davies, F. B.** et al., “Heating of the Intergalactic Medium by Hydrogen Reionization”, 2019, *ApJ*, 874, 154

30. Wang, F., ... **Davies, F. B.** et al., “The Discovery of A Luminous Broad Absorption Line Quasar at A Redshift of 7.02”, 2018, *ApJL*, 869, L9

31. Eilers, A.-C., Hennawi, J. F., **Davies, F. B.**, “First Spectroscopic Study of a Young Quasar”, 2018, *ApJ*, 867, 30

32. Eilers, A.-C., **Davies, F. B.**, Hennawi, J. F., “The Opacity of the Intergalactic Medium Measured Along Quasar Sightlines at  $z \sim 6$ ”, 2018, *ApJ*, 864, 53

- Co-author Publications (continued)
33. Becker, G. D., **Davies, F. B.**, Furlanetto, S. R., Malkan, M. A., Boera, E., Douglass, C., “Evidence for Large-scale Fluctuations in the Metagalactic Ionizing Background Near Redshift Six”, 2018, *ApJ*, 863, 92
34. Schmidt, T., Hennawi, J. F., Worseck, G., **Davies, F. B.**, Lukić, Z., Oñorbe, J., “Modeling the Hell Transverse Proximity Effect: Constraints on Quasar Lifetime and Obscuration”, 2018, *ApJ*, 861, 122
35. Walker, R. C., Hardee, P. E., **Davies, F. B.**, Ly, C., Junor, W., “The Structure and Dynamics of the Subparsec Jet in M87 Based on 50 VLBA Observations over 17 Years at 43 GHz”, 2018, *ApJ*, 855, 128
36. Bañados, E., ... **Davies, F. B.** et al., “An 800 million solar mass black hole in a significantly neutral universe at redshift 7.5”, 2018, *Nature*, 553, 473
37. D’Aloisio, A., McQuinn, M., **Davies, F. B.**, Furlanetto, S. R., “Large Fluctuations in the High-Redshift Metagalactic Ionizing Background”, 2018, *MNRAS*, 473, 560
38. Mas-Ribas, L., Hennawi, J. F., Dijkstra, M., **Davies, F. B.**, Stern, J., Rix, H.-W., “Small-scale Intensity Mapping: Extended Halos as a Probe of the Ionizing Escape Fraction and Faint Galaxy Populations during Reionization”, 2017, *ApJ*, 846, 11
39. Eilers, A.-C., **Davies, F. B.**, Hennawi, J. F., Prochaska, J. X., Lukić, Z., Mazzucchelli, C., “Implications of  $z \sim 6$  Quasar Proximity Zones for the Epoch of Reionization and Quasar Lifetimes”, 2017, *ApJ*, 840, 24
40. Muñoz, J. A., Peng, S. O., **Davies, F. B.**, Furlanetto, S. R., “The flatness and sudden evolution of the intergalactic ionizing background”, 2016, *MNRAS*, 455, 1385
41. Abramowski, A., ... **Davies, F.** et al., “The 2010 Very High Energy  $\gamma$ -ray Flare and 10 Years of Multi-wavelength Observations of M 87”, 2012, *ApJ*, 746, 151
42. Acciari, A., ... **Davies, F.** et al., “Radio Imaging of the Very-High-Energy  $\gamma$ -Ray Emission Region in the Central Engine of a Radio Galaxy”, 2009, *Science*, 325, 444

#### ADDITIONAL INFORMATION

- Grant Awards
- 2018 · Co-I of NSF grant [AST-1816006](#) (\$482k)
- 2017 · PI of [HST-AR-15014](#) (\$185k)
- Fellowship Awards
- 2017 · Humboldt Research Fellowship – Declined
- 2014-2015 · UCLA Dissertation Year Fellowship
- 2010-2011 · UCLA Graduate Division Chancellor’s Prize
- Computing Allocations
- 2020 · Co-I of INCITE award “Decoding the physics of the Intergalactic Medium” (500k node hours on Summit, PI: Zarija Lukić)
- Observing
- Co-I of several successful HST, VLT, Keck, Gemini, ALMA, NOEMA proposals. Observed in person at Subaru (HSC) and Keck (DEIMOS/NIRES).
- 2019 · PI of GN-2019A-FT-114/GN-2019B-FT-107, 3.8 hr (Gemini North), “Pilot GRACES Study of Metals in a Proximate DLA at  $z \sim 6$ ”
- Teaching (UCLA)
- Winter 2014 · ASTR 6 TA “Cosmology: Our Changing Concepts of Universe”
- Spring 2013 · ASTR 82 TA “Stellar Evolution, Galaxies, and Cosmology”
- Invited Talks
- Jan 2020 · Next-Generation Cosmology with Next-Generation Radio Telescopes: II Sesto, Italy
- Jan 2020 · 235th AAS Meeting Special Session: The Scientific Quest for High-angular Resolution, Honolulu, HI
- Jun 2019 · What Matter(s) Between Galaxies, Abbazia di Spineto, Italy
- Oct 2018 · Berkeley Cosmology Seminar, University of California, Berkeley
- Sep 2018 · IGM2018, Kavli IPMU

Sep 2016 · IMPRS Summer School 2016, University of Heidelberg

*Public Outreach*

Feb 2018 · Presentation at Astronomy on Tap, Santa Barbara  
“How Fast Can You Grow a Supermassive Black Hole?”

2010-2014 · UCLA Exploring Your Universe – Volunteer

*Other Service*

External Reviewer for NAOC Telescope Access Program

Referee for several ApJ and MNRAS articles

Hubble Space Telescope Cycle 27 TAC Member

Contributor to [PypeIt](#); an open source spectrographic data reduction pipeline

November 8, 2020