JAKOB M. HELTON

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CURRENT POSITION

A fourth-year doctoral student at the University of Arizona pursuing an M.S. and Ph.D. in Astronomy, with research focused on understanding the formation and evolution of galaxies and galaxy clusters in the early Universe. Member of the JWST Advanced Deep Extragalactic Survey (JADES) in addition to the Near-Infrared Camera (NIRCam) and the Mid-Infrared Instrument (MIRI) Science Teams.

EDUCATION

University of Arizona *August 2021 - Present*
Degree: M.S. and Ph.D. Concentration: Astronomy

Princeton University *September 2017 - May 2021*
Degree: B.A. Concentration: Astrophysical Sciences

FIRST AUTHOR PUBLICATIONS

6. **J. M. Helton**, G. H. Rieke, S. Alberts, et al., *The Stellar Populations and Rest-Frame Colors of Star-Forming Galaxies at $z \approx 8$: Exploring the Impact of Filter Choice and Star Formation History Assumption with JADES*, 2024, ApJ, in preparation

5. **J. M. Helton**, G. H. Rieke, S. Alberts, et al., *JWST/MIRI photometric detection at* 7.7 μm *in a galaxy at $z > 14$*, 2024, Nature Astronomy, in review

4. **J. M. Helton**, F. Sun, C. Woodrum, et al., *Identification of High-Redshift Galaxy Overdensities in GOODS-N and GOODS-S*, 2024, ApJ, accepted

3. **J. M. Helton**, F. Sun, C. Woodrum, et al., *The JWST Advanced Deep Extragalactic Survey: Discovery of an Extreme Galaxy Overdensity at $z = 5.4$ with JWST/NIRCam in GOODS-S*, 2024, ApJ, 962, 124

2. **J. M. Helton**, A. L. Strom, J. E. Greene, et al., *The nebular properties of star-forming galaxies at intermediate redshift from the Large Early Galaxy Astrophysics Census*, 2022, ApJ, 934, 81

1. **J. M. Helton**, S. D. Johnson, J. E. Greene, et al., *Discovery and origins of giant optical nebulae surrounding quasar PKS0454−22*, 2021, MNRAS, 505, 4

SECOND AUTHOR PUBLICATIONS

2. K. N. Hainline, **J. M. Helton**, B. D. Johnson, et al., *Brown Dwarf Candidates in the JADES and CEERS Extragalactic Surveys*, 2024, ApJ, 964, 66

1. F. Sun, **J. M. Helton**, E. Egami, et al., *JADES: Resolving the Stellar Component and Filamentary Overdense Environment of Hubble Space Telescope (HST)-dark Submillimeter Galaxy HDF850.1 at $z = 5.18$*, 2024, ApJ, 961, 69

THIRD AUTHOR PUBLICATIONS

2. L. Sandles, F. D'Eugenio, **J. M. Helton**, et al., *JADES: deep spectroscopy of a low-mass galaxy at redshift* 2.3 *quenched by environment*, 2023, A&A, in review

1. S. Alberts, C. C. Williams, **J. M. Helton**, et al., *To high redshift and low mass: exploring the emergence of quenched galaxies and their environments at $3 < z < 6$ in the ultra-deep JADES MIRI F770W parallel*, 2024, ApJ, accepted

SELECTED CONTRIBUTING AUTHOR PUBLICATIONS

14. K. N. Hainline, F. D'Eugenio, et al., including **J. M. Helton**, *JADES: Spectroscopic Confirmation and Proper Motion for a T-Dwarf at* 2 *Kiloparsecs*, 2024, ApJL, in review

13. J. Witstok, R. Maiolino, et al., including **J. M. Helton**, *JADES: Primeval Lyman-α emitting galaxies reveal early sites of reionisation out to redshift* $z \sim 9$, 2024, MNRAS, in review

12. K. N. Hainline, F. D'Eugenio, et al., including **J. M. Helton**, *Searching for Emission Lines at* $z > 11$*: The Role of Damped Lyman-α and Hints About the Escape of Ionizing Photons*, 2024, ApJ, in review

11. Z. Li, Z. Cai, et al., including **J. M. Helton**, *MAGNIF: A Tentative Lensed Rotating Disk at* $z = 8.34$ *detected by JWST NIRCam WFSS with Dynamical Forward Modeling*, 2023, ApJ, in review

10. S. Lim, S. Tacchella, et al., including **J. M. Helton**, *The FLAMINGO simulation view of cluster progenitors observed in the epoch of reionization with JWST*, 2024, MNRAS, accepted

9. S. Carniani, K. Hainline, et al., including **J. M. Helton**, *A shining cosmic dawn: spectroscopic confirmation of two luminous galaxies at* $z \sim 14$, 2024, Nature, accepted

8. S. Alberts, J. Lyu, et al., including **J. M. Helton**, *SMILES Initial Data Release: Unveiling the Obscured Universe with MIRI Multi-band Imaging*, 2024, ApJ, accepted

7. B. Robertson, B. D. Johnson, et al., including **J. M. Helton**, *Earliest Galaxies in the JADES Origins Field: Luminosity Function and Cosmic Star-Formation Rate Density* 300 *Myr after the Big Bang*, 2024, ApJ, 970, 31

6. Y. Sun, G.-H. Lee, et al., including **J. M. Helton**, *Evolution of Gas Flows along the Starburst to Post-Starburst to Quiescent Galaxy Sequence*, 2024, MNRAS, 682, 40

5. K. N. Hainline, B. D. Johnson, et al., including **J. M. Helton**, *The Cosmos in its Infancy: JADES Galaxy Candidates at* $z > 8$ *in GOODS-S and GOODS-N*, 2024, ApJ, 964, 71

4. J. Witstok, R. Smit, et al., including **J. M. Helton**, *Inside the bubble: exploring the environments of reionisation-era Lyman-α emitting galaxies with JADES and FRESCO*, 2024, A&A, 682, A40

3. S. Tacchella, D. J. Eisenstein, et al., including **J. M. Helton**, *JADES Imaging of GN-z11: Revealing the Morphology and Environment of a Luminous Galaxy 430 Myr After the Big Bang*, 2023, ApJ, 952, 74

2. B. E. Robertson, S. Tacchella, et al., including **J. M. Helton**, *Identification and properties of intense star-forming galaxies at redshifts* $z > 10$, 2023, Nature Astronomy, 7, 611

1. S. Aiola, E. Calabrese, et al., including **J. M. Helton**, *The Atacama Cosmology Telescope: DR4 Maps and Cosmological Parameters*, 2020, JCAP, 12, 047

PRESENTATIONS

7. **Invited talk at the "Cosmic Dawn Revealed by JWST: The Physics of the First Stars, Galaxies, and Black Holes" Conference in Santa Barbara, CA (August 2024).** *Identification of High-Redshift Galaxy Overdensities in GOODS-N and GOODS-S.*

6. Poster at the "242th American Astronomical Society (AAS) Meeting" in Albuquerque, NM (June 2023). *The JWST Advanced Deep Extragalactic Survey: Discovery of an Extreme Galaxy Overdensity at* $z = 5.4$ *with JWST/NIRCam in GOODS-S.*

5. Talk at the "100 Years of Astronomy at the University of Arizona" Celebration in Tucson, AZ (April 2023). *The JWST Advanced Deep Extragalactic Survey: Discovery of an Extreme Galaxy Overdensity at* $z = 5.4$ *with JWST/NIRCam in GOODS-S.*

4. Talk at the "Early Results from the James Webb Space Telescope" Conference in Cambridge, United Kingdom (March 2023). *The JWST Advanced Deep Extragalactic Survey: Discovery of an Extreme Galaxy Overdensity at $z = 5.4$ with JWST/NIRCam in GOODS-S.*

3. Poster at the "International Astronomical Union (IAU) Symposium 373" in Busan, South Korea (August 2022). *The Spatially Resolved Star-Formation Histories of Post-Starburst Galaxies in SDSS-IV MaNGA.*

2. Poster at the "237th American Astronomical Society (AAS) Meeting", virtual (January 2021). *Discovery and origins of giant optical nebulae surrounding quasar PKS0454−22.*

1. Poster at the "235th American Astronomical Society (AAS) Meeting" in Honolulu, HI (January 2020). *The physical conditions in $0.6 < z < 1.0$ galaxies from LEGA-C.*

PRIMARY TELESCOPE ALLOCATIONS

JWST/NIRCam (Prime) & JWST/MIRI (Parallel)	19.7 Hours (PID: 4549; Co-PI)
JWST/NIRCam (Prime) & JWST/MIRI (Parallel)	37.2 Hours (PID: 4540; Co-I)
JWST/NIRSpec (Prime)	24.5 Hours (PID: 3659; Co-I)
JWST/NIRCam (Prime)	27.6 Hours (PID: 3577; Co-I)
JWST/NIRCam (Prime) & JWST/NIRSpec (Parallel)	135.6 Hours (PID: 3215; Co-I)
JWST/NIRSpec (Prime)	24.0 Hours (PID: 2959; Co-I)
JWST/NIRCam (Prime) & JWST/NIRISS (Parallel)	42.5 Hours (PID: 2883; Co-I)

OTHER TELESCOPE ALLOCATIONS

MMT/Binospec	3.0 Nights (Co-I)
Keck/MOSFIRE	0.5 Nights (Co-I)
Magellan/IMACS	5.0 Nights (Co-I)
Magellan/FIRE	6.5 Nights (Co-I)

SKILLS

Programming Languages	Python, IDL, Java, Javascript, HTML
Software & Tools	Unix, Excel, LaTeX, TensorFlow, FIREHOSE
Observing	Keck/MOSFIRE, Magellan/IMACS, Magellan/LDSS3

REFERENCES

Prof. Marcia Rieke	University of Arizona	mrieke@arizona.edu
Prof. Kevin Hainline	University of Arizona	kevinhainline@arizona.edu
Prof. Daniel Eisenstein	Harvard University	deisenstein@cfa.harvard.edu

OTHER CONTRIBUTING AUTHOR PUBLICATIONS

21. F. D'Eugenio, A. J. Cameron, et al., including **J. M. Helton**, *JADES Data Release 3 – NIRSpec/MSA spectroscopy for 4,000 galaxies in the GOODS fields*, 2024, ApJS, in review

20. S. Tacchella, W. McClymont, et al., including **J. M. Helton**, *Resolving the nature and putative nebular emission of GS9422: an obscured AGN without exotic stars*, 2024, MNRAS, in review

19. Z. Ji, C. C. Williams, et al., including **J. M. Helton**, *JADES: Rest-frame UV-to-NIR Size Evolution of Massive Quiescent Galaxies from Redshift $z = 5$ to $z = 0.5$*, 2024, ApJ, in review

18. C. Woodrum, M. Rieke, et al., including **J. M. Helton**, *JADES: Using NIRCam Photometry to Investigate the Dependence of Stellar Mass Inferences on the IMF in the Early Universe*, 2023, PNAS, in review

17. D. J. Eisenstein, B. D. Johnson, et al., including **J. M. Helton**, *The JADES Origins Field: A New JWST Deep Field in the JADES Second NIRCam Data Release*, 2023, ApJ, in review

16. W. M. Baker, S. Tacchella, et al., including **J. M. Helton**, *Inside-out growth in the early Universe: a core in a vigorously star-forming disc*, 2023, Nature Astronomy, in review

15. A. J. Bunker, A. J. Cameron, et al., including **J. M. Helton**, *JADES NIRSpec Initial Data Release for the Hubble Ultra Deep Field: Redshifts and Line Fluxes of Distant Galaxies from the Deepest JWST Cycle 1 NIRSpec Multi-Object Spectroscopy*, 2023, A&A, in review

14. D. J. Eisenstein, C. Willott, et al., including **J. M. Helton**, *Overview of the JWST Advanced Deep Extragalactic Survey (JADES)*, 2023, ApJ, in review

13. R. Endsley, D. P. Stark, et al., including **J. M. Helton**, *The Star-forming and Ionizing Properties of Dwarf $z \sim 6-9$ Galaxies in JADES: Insights on Bursty Star Formation and Ionized Bubble Growth*, 2024, MNRAS, accepted

12. Z. Ji, C. C. Williams, et al., including **J. M. Helton**, *JADES+JEMS: A Detailed Look at the Buildup of Central Stellar Cores and Suppression of Star Formation in Galaxies at Redshifts $3 < z < 4.5$*, 2024, ApJ, accepted

11. C. C. Williams, S. Alberts, et al., including **J. M. Helton**, *The Galaxies Missed by Hubble and ALMA: The Contribution of Extremely Red Galaxies to the Cosmic Census at $3 < z < 8$*, 2024, ApJ, 968, 34

10. A. Saxena, A. J. Bunker, et al., including **J. M. Helton**, *JADES: The production and escape of ionizing photons from faint Lyman-alpha emitters in the epoch of reionization*, 2024, A&A, 684, A84

9. M. Curti, R. Maiolino, et al., including **J. M. Helton**, *JADES: Insights into the low-mass end of the mass-metallicity-SFR relation at $3 < z < 10$ from deep JWST/NIRSpec spectroscopy*, 2024, A&A, 684, A75

8. R. Maiolino, J. Scholtz, et al., including **J. M. Helton**, *A small and vigorous black hole in the early Universe*, 2024, Nature, 627, 8002

7. M. J. Rieke, B. Robertson, et al., including **J. M. Helton**, *JADES Initial Data Release for the Hubble Ultra Deep Field: Revealing the Faint Infrared Sky with Deep JWST NIRCam Imaging*, 2023, ApJS, 269, 16

6. C. C. Williams, S. Tacchella, et al., including **J. M. Helton**, *JEMS: A Deep Medium-band Imaging Survey in the Hubble Ultra Deep Field with JWST NIRCam and NIRISS*, 2023, ApJS, 268, 64

5. A. J. Cameron, A. Saxena, et al., including **J. M. Helton**, *JADES: Probing interstellar medium conditions at $z \approx 5.5-9.5$ with ultra-deep JWST/NIRSpec spectroscopy*, 2023, A&A, 677, A115

4. A. J. Bunker, A. Saxena, et al., including **J. M. Helton**, *JADES NIRSpec Spectroscopy of GN-z11: Lyman-α emission and possible enhanced nitrogen abundance in a $z = 10.60$ luminous galaxy*, 2023, A&A, 677, A88

3. S. Tacchella, B. D. Johnson, et al., including **J. M. Helton**, *JWST NIRCam+NIRSpec: interstellar medium and stellar populations of young galaxies with rising star formation and evolving gas reservoirs*, 2023, MNRAS, 522, 4

2. E. Curtis-Lake, S. Carniani, et al., including **J. M. Helton**, *Spectroscopic confirmation of four metal-poor galaxies at $z = 10.3 - 13.2$*, 2023, Nature Astronomy, 7, 622

1. B. E. Robertson, S. Tacchella, et al., including **J. M. Helton**, *Morpheus Reveals Distant Disk Galaxy Morphologies with JWST: The First AI/ML Analysis of JWST Images*, 2023, ApJ, 942, 42