

# Johannes U. Lange

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## RESEARCH INTERESTS

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Dark Energy, Gravitational Lensing, Galaxy Formation, Statistical Methods and Machine Learning

## POSITIONS

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|--|-------------------|
| <b>American University</b><br>Assistant Professor  | 08/2024 – present |
| <b>University of Michigan</b><br>Leinweber Center for Theoretical Physics Fellow                 | 09/2022 – 07/2024 |
| <b>Stanford University</b><br>Stanford–Santa Cruz Cosmology Postdoctoral Fellow                  | 09/2021 – 08/2022 |
| <b>University of California, Santa Cruz</b><br>Stanford–Santa Cruz Cosmology Postdoctoral Fellow | 09/2019 – 08/2021 |

## EDUCATION

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|  |                   |
|--|-------------------|
| <b>Yale University</b><br>M.Sc., M.Phil, Ph.D. in Astronomy                  | 08/2014 – 08/2019 |
| <b>Ruprecht-Karls-Universität Heidelberg</b><br>Master of Science in Physics | 09/2012 – 08/2014 |
| <b>Freie Universität Berlin</b><br>Bachelor of Science in Physics            | 10/2009 – 08/2012 |

## TEACHING

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|  |                          |
|--|--------------------------|
| <b>Instructor, American University</b><br>Course: Data Mining and Machine Learning for Natural Sciences  | Fall 2025                |
| <b>Instructor, American University</b><br>Course: Changing Views of the Universe   | Spring 2025              |
| <b>Instructor, American University</b><br>Course: Modern Physics   | Fall 2024                |
| <b>Postdoctoral Course on STEM Teaching, University of Michigan</b><br>The Postdoctoral Short Course on College Teaching in STEM is a comprehensive 10-week program for postdocs to teach effectively as future faculty members.                   | Winter 2024              |
| <b>Adjunct Lecturer, University of Michigan</b><br>Course: Naked-Eye Astronomy   | Fall 2023                |
| <b>Certificate of College Teaching Preparation, Yale University</b><br>The Certificate of College Teaching Preparation (CCTP) is an opportunity for graduate students to engage in a comprehensive training program in effective college teaching. | 2014-2019                |
| <b>Teaching Fellow, Yale University</b><br>Course: Astrostatistics and Data Mining   | Spring 2016, Spring 2018 |
| <b>Teaching Fellow, Yale University</b><br>Course: Introduction to Astronomical Observing  | Fall 2017, Fall 2014     |

Teaching Fellow, Yale University

Fall 2015

Course: Introduction to Cosmology

Teaching Fellow, Yale University

Spring 2015

Course: Gravity, Astrophysics, and Cosmology

## ADVISING

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|   |              |
|---|--------------|
| <b>Simona Sotiri (undergraduate)</b>                            | 2025-present |
| Topic: The Lensing-is-Low Problem in FLAMINGO                   |              |
| <b>Henry Gray (undergraduate)</b>                               | 2025-present |
| Topic: The Dependence of Assembly Bias on Galaxy Properties     |              |
| <b>Alisun Coldiron (undergraduate)</b>                          | 2025-present |
| Topic: Galaxy-Halo Connection in FLAMINGO                       |              |
| <b>Abigail Fisher (undergraduate)</b>                           | 2025-present |
| Topic: Photometric Redshift Calibration                         |              |
| <b>Alexandra Wells (undergraduate, co-adviser)</b>              | 2024-2025    |
| Topic: Cosmology from Non-Linear Scales                         |              |
| <b>Alexandra Doytcheva (undergraduate)</b>                      | 2023-2024    |
| Topic: Galaxy Clustering and Control Variates                   |              |
| <b>Filomela Gerou (undergraduate)</b>                           | 2022-2024    |
| Topic: Galaxy Clustering and Control Variates                   |              |
| <b>Gilad Pifko (undergraduate)</b>                              | 2022-2023    |
| Topic: Relationship between Galaxy and Dark Matter Halo Size    |              |
| <b>Simon Wu (undergraduate)</b>                                 | 2022-2023    |
| Topic: Gravitational Lensing Contribution from Subhalos         |              |
| <b>Garv Shah (undergraduate)</b>                                | 2022-2023    |
| Topic: Boosting Importance Nested Sampling with Neural Networks |              |
| <b>Juliana Karp (undergraduate)</b>                             | 2022-2023    |
| Topic: Anisotropic Satellite Galaxy Quenching                   |              |
| <b>Diana Blanco (graduate, co-adviser)</b>                      | 2021-2025    |
| Topic: Photometric Redshift Calibration                         |              |
| <b>Enia Xhakaj (graduate, co-adviser)</b>                       | 2019-2023    |
| Topic: Gravitational Lensing                                    |              |

## FIRST-AUTHOR AND STUDENT-LED PAPERS

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- [15] A. Doytcheva, F. V. Gerou, and J. U. Lange. “High-precision Galaxy Clustering Predictions from Small-volume Hydrodynamical Simulations via Control Variates”. *ApJ* 977.2, 184 (Dec. 2024).
- [14] J. U. Lange et al. “Systematic Effects in Galaxy-Galaxy Lensing with DESI”. *The Open Journal of Astrophysics* 7, 57 (July 2024).
- [13] J. U. Lange. “NAUTILUS: boosting Bayesian importance nested sampling with deep learning”. *MNRAS* 525.2 (Oct. 2023), pp. 3181–3194.
- [12] J. S. M. Karp, J. U. Lange, and R. H. Wechsler. “Anisotropic Satellite Galaxy Quenching: A Unique Signature of Energetic Feedback by Supermassive Black Holes?” *ApJL* 949.1, L13 (May 2023).
- [11] J. U. Lange et al. “Constraints on  $S_8$  from a full-scale and full-shape analysis of redshift-space clustering and galaxy-galaxy lensing in BOSS”. *MNRAS* 520.4 (Apr. 2023), pp. 5373–5393.

- [10] J. U. Lange et al. “Five per cent measurements of the growth rate from simulation-based modelling of redshift-space clustering in BOSS LOWZ”. *MNRAS* 509.2 (Jan. 2022), pp. 1779–1804.
- [9] J. U. Lange et al. “On the halo-mass and radial scale dependence of the lensing is low effect”. *MNRAS* 502.2 (Apr. 2021), pp. 2074–2086.
- [8] J. U. Lange et al. “Cosmological Evidence Modelling: a new simulation-based approach to constrain cosmology on non-linear scales”. *MNRAS* 490.2 (Dec. 2019), pp. 1870–1878.
- [7] J. U. Lange et al. “New perspectives on the BOSS small-scale lensing discrepancy for the Planck  $\Lambda$ CDM cosmology”. *MNRAS* 488.4 (Oct. 2019), pp. 5771–5787.
- [6] J. U. Lange et al. “Updated results on the galaxy-halo connection from satellite kinematics in SDSS”. *MNRAS* 487.3 (Aug. 2019), pp. 3112–3129.
- [5] J. U. Lange et al. “Maturing satellite kinematics into a competitive probe of the galaxy-halo connection”. *MNRAS* 482.4 (Feb. 2019), pp. 4824–4845.
- [4] J. U. Lange et al. “Brightest galaxies as halo centre tracers in SDSS DR7”. *MNRAS* 473.2 (Jan. 2018), pp. 2830–2851.
- [3] J. U. Lange et al. “Evidence for Non-stellar Rest-frame Near-IR Emission Associated with Increased Star Formation in Galaxies at  $z \sim 1$ ”. *ApJL* 819.1, L4 (Mar. 2016).
- [2] J. U. Lange and M. -. Chu. “Can galactic dark matter substructure contribute to the cosmic gamma-ray anisotropy?” *MNRAS* 447.1 (Feb. 2015), pp. 939–947.
- [1] J. Lange and M. Pohl. “The average GeV-band emission from gamma-ray bursts”. *A&A* 551, A89 (Mar. 2013).

## OTHER CO-AUTHOR PAPERS

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- [28] S. J. Rauhut et al. “Testing gravitational physics by combining DESI DR1 and weak lensing datasets using the E\_G estimator”. *arXiv e-prints*, arXiv:2507.16098 (July 2025).
- [27] S. Heydenreich et al. “Lensing Without Borders: Measurements of galaxy-galaxy lensing and projected galaxy clustering in DESI DR1”. *arXiv e-prints*, arXiv:2506.21677 (June 2025).
- [26] M. Kwiecien et al. “Improving galaxy cluster selection with the outskirt stellar mass of galaxies”. *PRD* 111.12, 123524 (June 2025).
- [25] DESI Collaboration et al. “Data Release 1 of the Dark Energy Spectroscopic Instrument”. *arXiv e-prints*, arXiv:2503.14745 (Mar. 2025).
- [24] C. Blake et al. “The DESI-Lensing Mock Challenge: large-scale cosmological analysis of 3x2-pt statistics”. *The Open Journal of Astrophysics* 8, 24 (Mar. 2025).
- [23] S. Chen et al. “Analysis of DESI $\times$ DES using the Lagrangian effective theory of LSS”. *PRD* 110.10, 103518 (Nov. 2024).
- [22] K. Mitra, F. C. van den Bosch, and J. U. Lange. “BASILISK II. Improved constraints on the galaxy-halo connection from satellite kinematics in SDSS”. *MNRAS* 533.3 (Sept. 2024), pp. 3647–3675.
- [21] S. Yuan et al. “Redshift evolution and covariances for joint lensing and clustering studies with DESI Y1”. *MNRAS* 533.1 (Sept. 2024), pp. 589–607.
- [20] Y. Wang et al. “Measuring the Conditional Luminosity and Stellar Mass Functions of Galaxies by Combining the Dark Energy Spectroscopic Instrument Legacy Imaging Surveys Data Release 9, Survey Validation 3, and Year 1 Data”. *ApJ* 971.1, 119 (Aug. 2024).
- [19] DESI Collaboration et al. “The Early Data Release of the Dark Energy Spectroscopic Instrument”. *AJ* 168.2, 58 (Aug. 2024).
- [18] E. Xhakaj et al. “Cluster cosmology without cluster finding”. *MNRAS* 530.4 (June 2024), pp. 4203–4218.

- [17] DESI Collaboration et al. “Validation of the Scientific Program for the Dark Energy Spectroscopic Instrument”. *AJ* 167.2, 62 (Feb. 2024).
- [16] B. Hadzhiyska et al. “Synthetic light-cone catalogues of modern redshift and weak lensing surveys with ABACUSSUMMIT”. *MNRAS* 525.3 (Nov. 2023), pp. 4367–4387.
- [15] R. Ruggeri et al. “A data compression and optimal galaxy weights scheme for Dark Energy Spectroscopic Instrument and weak lensing data sets”. *MNRAS* 525.3 (Nov. 2023), pp. 3865–3878.
- [14] K. Wang et al. “Evidence of galaxy assembly bias in SDSS DR7 galaxy samples from count statistics”. *MNRAS* 516.3 (Nov. 2022), pp. 4003–4024.
- [13] DESI Collaboration et al. “Overview of the Instrumentation for the Dark Energy Spectroscopic Instrument”. *AJ* 164.5, 207 (Nov. 2022).
- [12] S. Huang et al. “The outer stellar mass of massive galaxies: a simple tracer of halo mass with scatter comparable to richness and reduced projection effects”. *MNRAS* 515.4 (Oct. 2022), pp. 4722–4752.
- [11] E. Xhakaj et al. “Beyond mass: detecting secondary halo properties with galaxy-galaxy lensing”. *MNRAS* 514.2 (Aug. 2022), pp. 2876–2890.
- [10] K. Dawson et al. “Snowmass2021 Cosmic Frontier White Paper: High Density Galaxy Clustering in the Regime of Cosmic Acceleration”. *arXiv e-prints*, arXiv:2203.07291 (Mar. 2022).
- [9] A. Leauthaud et al. “Lensing without borders - I. A blind comparison of the amplitude of galaxy-galaxy lensing between independent imaging surveys”. *MNRAS* 510.4 (Mar. 2022), pp. 6150–6189.
- [8] K. Wang et al. “Concentrations of dark haloes emerge from their merger histories”. *MNRAS* 498.3 (Nov. 2020), pp. 4450–4464.
- [7] F. C. van den Bosch, J. U. Lange, and A. R. Zentner. “Basilisk: Bayesian hierarchical inference of the galaxy-halo connection using satellite kinematics - I. Method and validation”. *MNRAS* 488.4 (Oct. 2019), pp. 4984–5013.
- [6] K. Wang et al. “How to optimally constrain galaxy assembly bias: supplement projected correlation functions with count-in-cells statistics”. *MNRAS* 488.3 (Sept. 2019), pp. 3541–3567.
- [5] A. R. Zentner et al. “Constraints on assembly bias from galaxy clustering”. *MNRAS* 485.1 (May 2019), pp. 1196–1209.
- [4] D. Campbell et al. “The galaxy clustering crisis in abundance matching”. *MNRAS* 477.1 (June 2018), pp. 359–383.
- [3] A. S. Villarreal et al. “The inimitable nature of assembly bias: the impact of halo definition on assembly bias”. *MNRAS* 472.1 (Nov. 2017), pp. 1088–1105.
- [2] E. J. Nelson et al. “Where Stars Form: Inside-out Growth and Coherent Star Formation from HST H $\alpha$  Maps of 3200 Galaxies across the Main Sequence at  $0.7 < z < 1.5$ ”. *ApJ* 828.1, 27 (Sept. 2016).
- [1] I. G. Momcheva et al. “The 3D-HST Survey: Hubble Space Telescope WFC3/G141 Grism Spectra, Redshifts, and Emission Line Measurements for  $\sim 100,000$  Galaxies”. *ApJS* 225.2, 27 (Aug. 2016).

## INVITED TALKS

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|                                    |         |
|------------------------------------|---------|
| <b>Astronomy Seminar</b>           | 05/2025 |
| Carnegie EPL                       |         |
| <b>Cosmology Seminar</b>           | 04/2025 |
| University of California, Berkeley |         |
| <b>CTC Seminar Series</b>          | 03/2025 |

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| University of Maryland   |         |
| <b>Physics Colloquium</b>  | 04/2024 |
| University of Hawaii   |         |
| <b>ITP Cosmology Seminar</b>   | 12/2023 |
| Ruprecht-Karls-Universität Heidelberg  |         |
| <b>Frontiers of Nested Sampling Workshop</b>   | 07/2023 |
| 42nd International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering |         |
| <b>Webinar Series</b>  | 06/2023 |
| National Observatory in Rio de Janeiro   |         |
| <b>Early Career Researcher Cosmology Seminar</b>   | 11/2022 |
| Korea Astronomy and Space Science Institute  |         |
| <b>HEAP Seminar</b>  | 12/2021 |
| University of Utah   |         |
| <b>Astronomy Colloquium</b>  | 09/2021 |
| Swinburne University of Technology   |         |
| <b>Growth of Structure Webinar</b>   | 07/2021 |
| University of California, Santa Cruz   |         |
| <b>Growth of Structure Webinar</b>   | 06/2021 |
| University of California, Santa Cruz   |         |
| <b>Research Progress Meeting</b>   | 01/2019 |
| Lawrence Berkeley National Laboratory  |         |
| <b>CCAPP Seminar</b>   | 01/2019 |
| Center for Cosmology and AstroParticle Physics   |         |
| <b>BCCP Seminar</b>  | 09/2018 |
| University of California, Berkeley   |         |
| <b>The Galaxy-Halo Connection Across Cosmic Time</b>   | 07/2017 |
| Kavli Institute for Theoretical Physics  |         |

## OUTREACH

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|   |                  |
|---|------------------|
| <b>Public Observing Nights at AU, Washington, DC</b>                      | 2024 - present   |
| <b>KIPAC Public Lecture, Palo Alto, CA</b>                                | 07/2022          |
| <b>Class at Stanford Splash, Palo Alto, CA</b>                            | 11/2021          |
| <b>Talk at Astronomy on Tap, New Haven, CT</b>                            | 06/2019          |
| <b>Talk at Institute for Learning in Retirement, New Haven, CT</b>        | 04/2019          |
| <b>Talks at Leitner Family Observatory, New Haven, CT</b>                 | 02/2018, 05/2019 |
| <b>Talks at Open Labs Science Cafe, Yale University, New Haven, CT</b>    | 10/2017, 04/2019 |
| <b>Member of Open Labs, Yale University, New Haven, CT</b>                | 2016 - 2019      |
| <b>Tutor at New Haven Reads, New Haven, CT</b>                            | 2015 - 2018      |
| <b>Member of UCSB Physics Circus, UC Santa Barbara, Santa Barbara, CA</b> | 2012             |

## HONORS AND AWARDS

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Brouwer Ph.D. Thesis Prize, Yale University  
 Cosmology Fellowship, UC Santa Cruz and Stanford University  
 Graduate Fellowship Program, Kavli Institute for Theoretical Physics  
 Henry A. Smith Fellowship, Yale University

DAAD (German Academic Exchange Service) Scholarship  
Deutschlandstipendium National Scholarship Program  
Ernst Reuter Scholarship, Free University of Berlin

## LEADERSHIP ROLES

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|  |                |
|--|----------------|
| Co-Chair of the NASA Cosmic Structure Science Interest Group | 2025 - present |
| Co-Chair of the DESI desilike Topical Group                  | 2024 - present |
| Co-Chair of the DESI C <sup>3</sup> Working Group            | 2022 - 2024    |

## COMMITTEE MEMBERSHIP

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|---|----------------|
| Stanford Physics Equity & Inclusion Committee   | 2021 - 2022    |
| DESI Professional Development Mentoring Program | 2021 - present |
| DESI Early Career Scientists Committee          | 2021 - 2022    |
| UCSC Astronomy Department Colloquium Committee  | 2019 - 2020    |
| Yale Graduate Admissions Committee              | 2018 - 2019    |

## REVIEWER SERVICE

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Astronomy & Astrophysics  
Monthly Notices of the Royal Astronomical Society  
The Astrophysical Journal  
Journal of Cosmology and Astroparticle Physics  
DESI Internal Reviewer  
National Science Foundation

## SCIENTIFIC ORGANIZING COMMITTEES

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|   |         |
|---|---------|
| NASA's Physics of the Cosmos Early Career Workshop                            | 09/2025 |
| KICP Workshop   | 08/2023 |
| Lensing at Different Scales: Strong, Weak, and Synergies Between the Two      |         |
| Michigan Cosmology Summer School 2023   | 06/2023 |
| KITP Online Conference  | 08/2020 |
| The Galaxy-Halo Connection Across Cosmic Time: Recent Updates                 |         |
| KIPAC Online Workshop   | 07/2020 |
| Precision Measurements and Modeling of Lensing and Clustering in the DESI Era |         |

## REFERENCES

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**Frank C. van den Bosch**

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**Alexie Leauthaud**

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**Dragan Huterer**

University of Michigan

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