Johannes U. Lange

Departments of Physics, American University
610-470-4833 | jlange@american.edu | johannesulf.github.io

RESEARCH INTERESTS

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

POSITIONS

American University 08/2024 – present
Assistant Professor

University of Michigan 09/2022 – 07/2024
Leinweber Center for Theoretical Physics Fellow

Stanford University 09/2021 – 08/2022
Stanford–Santa Cruz Cosmology Postdoctoral Fellow

University of California, Santa Cruz 09/2019 – 08/2021
Stanford–Santa Cruz Cosmology Postdoctoral Fellow

EDUCATION

Yale University 08/2014 – 08/2019
M.Sc., M.Phil, Ph.D. in Astronomy

Ruprecht-Karls-Universität Heidelberg 09/2012 – 08/2014
Master of Science in Physics

Freie Universität Berlin 10/2009 – 08/2012
Bachelor of Science in Physics

TEACHING

Instructor, American University Spring 2025
Course: Changing Views of the Universe

Instructor, American University Fall 2024
Course: Modern Physics

Postdoctoral Course on STEM Teaching, University of Michigan Winter 2024
The Postdoctoral Short Course on College Teaching in STEM is a comprehensive 10-week program for postdocs to teach effectively as future faculty members.

Adjunct Lecturer, University of Michigan Fall 2023
Course: Naked-Eye Astronomy

Certificate of College Teaching Preparation, Yale University 2014-2019
The Certificate of College Teaching Preparation (CCTP) is an opportunity for graduate students to engage in a comprehensive training program in effective college teaching.

Teaching Fellow, Yale University Spring 2016, Spring 2018
Course: Astrostatistics and Data Mining

Teaching Fellow, Yale University Fall 2017, Fall 2014
Course: Introduction to Astronomical Observing

Teaching Fellow, Yale University Fall 2015
Course: Introduction to Cosmology

Teaching Fellow, Yale University Spring 2015
Course: Gravity, Astrophysics, and Cosmology

ADVISING

Alisun Coldiron (undergraduate) 2025-present
Topic: Galaxy-Halo Connection in FLAMINGO

Abigail Fisher (undergraduate) 2025-present
Topic: Photometric Redshift Calibration

Alexandra Wells (undergraduate, co-adviser) 2024-present
Topic: Cosmology from Non-Linear Scales

Alexandra Doytcheva (undergraduate) 2023-2024
Topic: Galaxy Clustering and Control Variates

Filomela Gerou (undergraduate) 2022-2024
Topic: Galaxy Clustering and Control Variates

Diana Blanco (graduate, co-adviser) 2021-present
Topic: Photometric Redshift Calibration

Juliana Karp (undergraduate) 2022-2023
Topic: Anisotropic Satellite Galaxy Quenching

Gilad Pifko (undergraduate) 2022-2023
Topic: Relationship between Galaxy and Dark Matter Halo Size

Simon Wu (undergraduate) 2022-2023
Topic: Gravitational Lensing Contribution from Subhalos

Garv Shah (undergraduate) 2022-2023
Topic: Boosting Importance Nested Sampling with Neural Networks

Enia Xhakaj (graduate, co-adviser) 2019-2023
Topic: Gravitational Lensing

FIRST-AUTHOR AND STUDENT-LED PAPERS

[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 ΛCDM 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 ~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

[25] 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).
[24] S. Chen et al. "Analysis of DESI×DES using the Lagrangian effective theory of LSS". *PRD* 110.10, 103518 (Nov. 2024).
[23] M. Kwiecien et al. "Improving Galaxy Cluster Selection with the Outskirt Stellar Mass of Galaxies". *arXiv e-prints*, arXiv:2410.20205 (Oct. 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 waith 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 immitigable 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 Hα 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 ~100,000 Galaxies". *ApJS* 225.2, 27 (Aug. 2016).

INVITED TALKS

Astronomy Seminar 05/2025
Carnegie EPL

Cosmology Seminar 04/2025
University of California, Berkeley

CTC Seminar Series 03/2025

University of Maryland

Physics Colloquium 04/2024
University of Hawaii

ITP Cosmology Seminar 12/2023
Ruprecht-Karls-Universität Heidelberg

Frontiers of Nested Sampling Workshop 07/2023
42nd International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering

Webinar Series 06/2023
National Observatory in Rio de Janeiro

Early Career Researcher Cosmology Seminar 11/2022
Korea Astronomy and Space Science Institute

HEAP Seminar 12/2021
University of Utah

Astronomy Colloquium 09/2021
Swinburne University of Technology

Growth of Structure Webinar 07/2021
University of California, Santa Cruz

Growth of Structure Webinar 06/2021
University of California, Santa Cruz

Research Progress Meeting 01/2019
Lawrence Berkeley National Laboratory

CCAPP Seminar 01/2019
Center for Cosmology and AstroParticle Physics

BCCP Seminar 09/2018
University of California, Berkeley

The Galaxy-Halo Connection Across Cosmic Time 07/2017
Kavli Institute for Theoretical Physics

OUTREACH

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

HONORS AND AWARDS

- Brouwer Ph.D. Thesis Prize, Yale University
- Cosmology Fellowship, University of California, 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
- Dean's List, University of California, Santa Barbara

LEADERSHIP AND SERVICE

- NASA Cosmic Structure Science Interest Group Co-Chair, 2025 - present
- Co-Chair of the Dark Energy Spectroscopic Instrument (DESI) C^3 Working Group, 2022 - 2024
- Reviewer for Astronomy & Astrophysics, Monthly Notices of the Royal Astronomical Society, and The Astrophysical Journal
- Reviewer for the National Science Foundation, 2022
- Member of the Stanford Physics Equity & Inclusion Committee, 2021 - 2022
- Member of the DESI Early Career Scientists Committee, 2021 - 2022
- Mentor for the DESI Diversity, Equity, and Inclusion Mentorship Program, 2021 - present
- Member of the UCSC Astronomy Department Colloquium Committee, 2019 - 2020
- Member of the Yale Graduate Admissions Committee, 2018 - 2019
- SOC Member for KICP Workshop "Lensing at different scales: strong, weak, and synergies between the two", 08/2023
- SOC Member for the Michigan Cosmology Summer School 2023, 06/2023
- SOC Member for the KITP Online Conference "The Galaxy-Halo Connection Across Cosmic Time: Recent Updates", 08/2020
- SOC Member for the KIPAC Online Workshop "Precision Measurements and Modeling of Lensing and Clustering in the DESI Era", 07/2020

REFERENCES

Frank C. van den Bosch
Yale University
frank.vandenosch@yale.edu

Andrew P. Hearin
Argonne National Laboratory
ahearin@anl.gov

Alexie Leauthaud
University of California, Santa Cruz
alexie@ucsc.edu

Dragan Huterer
University of Michigan
huterer@umich.edu