

# Johannes U. Lange

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## RESEARCH INTERESTS

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Cosmology, Galaxy-Halo Connection, Galaxy Formation, Statistical Methods and Machine Learning

## EDUCATION

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

## POSITIONS

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<b>University of Michigan</b> Leinweber Center for Theoretical Physics Fellow	09/2022 – present
<b>Stanford University</b> Stanford–Santa Cruz Cosmology Postdoctoral Fellow	09/2021 – 08/2022
<b>University of California, Santa Cruz</b> Stanford–Santa Cruz Cosmology Postdoctoral Fellow	09/2019 – 08/2021

## TEACHING

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<b>Postdoctoral Course on STEM Teaching, University of Michigan</b> 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> Course: Naked-Eye Astronomy	Fall 2023
<b>Certificate of College Teaching Preparation, Yale University</b> 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> Course: Astrostatistics and Data Mining	Spring 2016, Spring 2018
<b>Teaching Fellow, Yale University</b> Course: Introduction to Astronomical Observing	Fall 2017, Fall 2014
<b>Teaching Fellow, Yale University</b> Course: Introduction to Cosmology	Fall 2015
<b>Teaching Fellow, Yale University</b> Course: Gravity, Astrophysics, and Cosmology	Spring 2015

## ADVISING

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<b>Alexandra Doytcheva (undergraduate)</b> Topic: Galaxy Clustering and Control Variates	2023-present
<b>Filomela Gerou (undergraduate)</b> Topic: Galaxy Clustering and Control Variates	2022-2024
<b>Diana Blanco (graduate, co-adviser)</b> Topic: Photometric Redshift Calibration	2021-present
<b>Juliana Karp (undergraduate)</b> Topic: Anisotropic Satellite Galaxy Quenching	2022-2023
<b>Gilad Pifko (undergraduate)</b> Topic: Relationship between Galaxy and Dark Matter Halo Size	2022-2023
<b>Simon Wu (undergraduate)</b> Topic: Gravitational Lensing Contribution from Subhalos	2022-2023
<b>Garv Shah (undergraduate)</b> Topic: Boosting Importance Nested Sampling with Neural Networks	2022-2023
<b>Enia Xhakaj (graduate, co-adviser)</b> Topic: Gravitational Lensing	2019-2023

## LEAD-AUTHOR PUBLICATIONS

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- [14] J. U. Lange et al. “Systematic Effects in Galaxy-Galaxy Lensing with DESI”. *arXiv e-prints*, arXiv:2404.09397 (Apr. 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).

## CO-AUTHOR PUBLICATIONS

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- [21] E. Xhakaj et al. “Cluster cosmology without cluster finding”. *MNRAS* 530.4 (June 2024), pp. 4203–4218.
- [20] S. Yuan et al. “Redshift evolution and covariances for joint lensing and clustering studies with DESI Y1”. *arXiv e-prints*, arXiv:2403.00915 (Mar. 2024).
- [19] DESI Collaboration et al. “Validation of the Scientific Program for the Dark Energy Spectroscopic Instrument”. *AJ* 167.2, 62 (Feb. 2024).
- [18] Y. Wang et al. “Measuring the conditional luminosity and stellar mass functions of galaxies by combining the DESI LS DR9, SV3 and Y1 data”. *arXiv e-prints*, arXiv:2312.17459 (Dec. 2023).
- [17] 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.
- [16] 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.
- [15] DESI Collaboration et al. “The Early Data Release of the Dark Energy Spectroscopic Instrument”. *arXiv e-prints*, arXiv:2306.06308 (June 2023).
- [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 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>Physics Colloquium</b> University of Hawaii	04/2024
<b>ITP Cosmology Seminar</b> Ruprecht-Karls-Universität Heidelberg	12/2023
<b>Frontiers of Nested Sampling Workshop</b> 42nd International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering	07/2023
<b>Webinar Series</b> National Observatory in Rio de Janeiro	06/2023
<b>Early Career Researcher Cosmology Seminar</b> Korea Astronomy and Space Science Institute	11/2022
<b>HEAP Seminar</b> University of Utah	12/2021
<b>Astronomy Colloquium</b> Swinburne University of Technology	09/2021
<b>Growth of Structure Webinar</b> University of California, Santa Cruz	07/2021
<b>Growth of Structure Webinar</b> University of California, Santa Cruz	06/2021
<b>Research Progress Meeting</b> Lawrence Berkeley National Laboratory	01/2019
<b>CCAPP Seminar</b> Center for Cosmology and AstroParticle Physics	01/2019
<b>BCCP Seminar</b> University of California, Berkeley	09/2018
<b>The Galaxy-Halo Connection Across Cosmic Time</b> Kavli Institute for Theoretical Physics	07/2017

## OUTREACH

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- 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

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- 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

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- Co-Chair of the Dark Energy Spectroscopic Instrument (DESI) C<sup>3</sup> Working Group, 2022 - present
- 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 - 2023
- 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

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**Frank C. van den Bosch**  
 Yale University  
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**Andrew P. Hearin**  
 Argonne National Laboratory  
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**Alexie Leauthaud**  
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