SIHAN (SANDY) YUAN

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RESEARCH INTEREST

I am broadly interested in the interpretation of the observed galaxy distribution and the inference of underlying galaxy evolution physics and cosmology.

keywords: *galaxy clustering, galaxy-dark matter connection, assembly bias, cosmological simulations, statistics, Bayesian inference, high performance computing.*

EDUCATION

Harvard University *September 2016 - May 2021*

Ph.D. Astronomy and Astrophysics GPA: 3.96/4.00

• Thesis (Tentative): *Towards better interpretation of small-scale structure of the Universe.*

Adviosr: *Prof. Daniel J. Eisenstein*

Princeton University *September 2012 - May 2016*

A.B. Astrophysical Sciences GPA: 3.95/4.00

• Honors: *summa cum laude, Phi Beta Kappa, Sigma Xi Book Award, Shapiro Prize for Academic Excellence*

• Thesis: *Photometric Identification and Studies of Ultra Diffuse Galaxies In Hyper Suprime-Cam.*

• Advisor: *Prof. David N. Spergel*

PUBLICATIONS (9 TOTAL, 7 FIRST AUTHOR, >100 CITATIONS)

• *Evidence for galaxy assembly bias in BOSS CMASS redshift-space galaxy correlation function*

Sihan Yuan, Boryana Hadzhiyska, Sownak Bose, Daniel J. Eisenstein, and Hong Guo, 2021, MNRAS, 502 (3): 3582-3598

Summary: We show a novel implementation of galaxy assembly bias that can describe both the observed full-shape galaxy clustering and resolve the long-standing tension in galaxy-galaxy lensing.

• *Can Assembly Bias Explain the Lensing Amplitude of the BOSS CMASS Sample in a Planck Cosmology?*

Sihan Yuan, Daniel J. Eisenstein, and Alexie Leauthaud, 2020, MNRAS, 493 (4): 5551-5564

Summary: We show that the traditional concentration-based assembly bias fails to explain the tension in galaxy-galaxy lensing.

• *A Hybrid Deep Learning Approach to Cosmological Constraints From Galaxy Redshift Surveys*

Michelle Ntampaka, Daniel J. Eisenstein, **Sihan Yuan**, and Lehman H. Garrison, 2020, ApJ, 889 (2): 151-166

Contribution: I supplied large training and validation simulated mocks for the deep learning pipeline.

• *Decorrelating the errors of the galaxy correlation function with compact transformation matrices*

Sihan Yuan, and Daniel J. Eisenstein, 2019, MNRAS, 486 (1): 708-724

Summary: We propose an elegant regularization model for the 2-point correlation function covariance matrix.

• *Exploring the squeezed three-point galaxy correlation function with generalized halo occupation distribution models*

Sihan Yuan, Daniel J. Eisenstein, and Lehman H. Garrison, 2018, MNRAS, 478 (2): 2019-2033

Summary: We propose a sophisticated halo occupation distribution model that includes physically motivated extensions.

• *Using galaxy pairs to investigate the three-point correlation function in the squeezed limit*

Sihan Yuan, Daniel J. Eisenstein, and Lehman H. Garrison, 2017, MNRAS, 472 (1): 577-590

Summary: We propose the 3-point correlation function in the squeezed limit as an efficient and interpretable small-scale statistic.

• *Spectroscopic Identification of Type 2 Quasars at $Z < 1$ in SDSS-III/BOSS*
Sihan Yuan, Michael Strauss, and Nadia Zakamska, 2016, MNRAS, 462 (2): 1603-1615
Summary: We spectroscopically identify the largest set of type 2 quasars to date.

• *The Physical Nature of the Most Metal-Poor Damped Lyman Alpha Systems*
Sihan Yuan, and Renyue Cen, 2016, MNRAS, 457 (1): 487-495
Summary: We use cosmological simulations to probe the nature of metal-poor damped lyman-α systems at $z = 3$.

• *New light on 21cm intensity fluctuations from the dark ages*
Yacine Ali-Haïmoud, P. Daniel Meerburg, and **Sihan Yuan**, 2014, Phys. Rev. D 89, 083506
Contribution: I contributed to the early analysis predicting the effect of relative velocity between baryons and dark matter on the matter power spectrum.

SELECTED TALKS

Kavli Institute for Theoretical Physics Reunion Conference, Santa Barbara (Virtual) August 2020
Talk (invited): *Assembly Bias and the Application of the Galaxy-Halo Connection in Cosmological Studies*

Special Seminar, National Astronomical Observatory of China, Beijing August 2018
Talk: *Generalizing the Halo Occupation Distribution Model and testing the Squeezed 3PCF.*

Institute for Theory and Computation Luncheon, Harvard University, Cambridge May 2017
Talk: *Using galaxy pairs to investigate the three-point correlation function in the squeezed limit.*

Cosmology Group Meeting, Center for Computational Astrophysics, New York March 2017
Talk: *Constraining high mass end of HOD with the squeezed 3-point correlation function.*

Hyper-Suprime Camera Collaboration Meetings, University of Tokyo, Tokyo August 2016
Talk: *Photometric identification and characterization of low surface brightness galaxies In Hyper Suprime-Cam Ultradeep data.*

SERVICE AND TEACHING

Journal Referee 2018-Present
Monthly Notices of the Royal Astronomical Society

Teaching Fellow 2017-2018
Harvard University *Cambridge, MA*

· Led weekly sections and designed/graded homework for AY17 and AY130.
· Co-supervised lab sections and telescope observing runs.

Treasurer/Co-Founder 2017-2018
Open Labs At Harvard *Cambridge, MA*

· Co-led quarterly science outreach events to engage K-12 students in local underprivileged communities through interactive sessions and TED-like talks.
· Applied for and managed an annual budget of ∼$2000.

Group Leader 2016-2018
Harvard Observing Project *Cambridge, MA*

· Led public observing runs using the 0.4m Clay Telescope.

TECHNICAL SKILLS

Programming	Proficient in Python, bash, MATLAB. Working knowledge of Java and C
Languages	Mandarin (Native), English (Bilingual)