

# LEHMAN H. GARRISON

*Cosmology — Large-Scale Structure*  
*High-Performance Computing —*  
*N-body Simulations*

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EMPLOYMENT	<b>Flatiron Research Fellow</b> Cosmology X Data Science Group Center for Computational Astrophysics Flatiron Institute, New York, NY	2019–present
EDUCATION	<b>Ph.D., Astronomy and Astrophysics</b> <i>Harvard University</i> , Cambridge, MA Thesis: <i>Computational Modeling of Large-Scale Structure with Abacus</i> Advisor: Daniel J. Eisenstein	2013–2019
	<b>B.A., Astrophysical Sciences</b> (High Honors) <i>Princeton University</i> , Princeton, NJ Thesis: <i>Galactic Warp Excitation by the Magellanic Clouds</i> Advisors: David N. Spergel, Naoki Yoshida (U. Tokyo)	2009–2013
AWARDS AND HONORS	<b>Eric Keto Prize</b> Best Ph.D. Thesis in Theoretical Astrophysics at Harvard University	April 2019
	<b>Smith Family Graduate Science and Engineering Fellowship</b> <i>Harvard University</i>	2013
	<b>Sigma Xi Book Award</b> Best Senior Thesis in Astronomy at Princeton University	June 2013
PROFESSIONAL SERVICE	<i>Co-chair</i> , DESI Cosmological Simulations Working Group <i>Referee</i> , MNRAS & ApJ <i>Graduate Student Representative</i> , CfA Library Committee	Oct. 2020– since 2016 2017–2019
SELECTED PUBLICATIONS	<b>First Author Publications</b> 8. <i>Self-Similarity of <math>k</math>-Nearest Neighbor Distributions in Scale-Free Simulations</i> , <b>Garrison, L. H.</b> , Abel, T., & Eisenstein, D. J. 2021, submitted 7. <i>The ABACUS Cosmological <math>N</math>-body Code</i> , <b>Garrison, L. H.</b> , Eisenstein, D. J., Ferrer, D., Maksimova, N. A., & Pinto, P. A. 2021a, MNRAS, 508, 575 6. <i>Good and Proper: Self-Similarity of <math>N</math>-body Simulations with Proper Force Softening</i> , <b>Garrison, L. H.</b> , Joyce, M., & Eisenstein, D. J. 2021b, MNRAS	

5. *Checkpointing with cp: the POSIX Shared Memory System*, **Garrison, L. H.**, Eisenstein, D., & Maksimova, N. 2021, NERSC First International Symposium on Checkpointing for Supercomputing
4. *Generating Approximate Halo Catalogues for Blind Challenges in Precision Cosmology*, **Garrison, L. H.**, & Eisenstein, D. J. 2019, MNRAS, 485, 2407
3. *A High-Fidelity Realization of the Euclid Code Comparison N-body Simulation with Abacus*, **Garrison, L. H.**, Eisenstein, D. J., & Pinto, P. A. 2019, MNRAS, 485, 3370
2. *The Abacus Cosmos: a Suite of Cosmological N-body Simulations*, **Garrison, L. H.**, Eisenstein, D. J., Ferrer, D., et al. 2018, The Astrophysical Journal Supplement Series, 236, 43
1. *Improving Initial Conditions for Cosmological N-body Simulations*, **Garrison, L. H.**, Eisenstein, D. J., Ferrer, D., Metchnik, M. V., & Pinto, P. A. 2016, MNRAS, 461, 4125

#### Contributing Author Publications

16. *The halo light cone catalogues of ABACUSUMMIT*, Hadzhiyska, B., **Garrison, L. H.**, Eisenstein, D. J., & Bose, S. 2021b, submitted
15. *ABACUSHOD: A highly efficient extended multi-tracer HOD framework and its application to BOSS and eBOSS data*, Yuan, S., **Garrison, L. H.**, Hadzhiyska, B., Bose, S., & Eisenstein, D. J. 2021, submitted
14. *Constructing high-fidelity halo merger trees in ABACUSUMMIT*, Bose, S., Eisenstein, D., Hadzhiyska, B., et al. 2021, submitted
13. *COMPASO: A new halo finder for competitive assignment to spherical overdensities*, Hadzhiyska, B., Eisenstein, D., Bose, S., **Garrison, L. H.**, & Maksimova, N. 2021a, MNRAS, accepted
12. *ABACUSUMMIT: A Massive Set of High-Accuracy, High-Resolution N-Body Simulations*, Maksimova, N., **Garrison, L. H.**, Eisenstein, D., et al. 2021, MNRAS, accepted
11. *Accuracy of power spectrum measurements in dissipationless cosmological simulations*, Maleubre, S., Eisenstein, D., **Garrison, L. H.**, & Joyce, M. 2021, arXiv e-prints
10. *Testing Dark Matter Halo Properties Using Self-Similarity*, Leroy, M., **Garrison, L. H.**, Eisenstein, D., Joyce, M., & Maleubre, S. 2021, MNRAS, 501, 5064
9. *Quantifying Resolution in Cosmological N-body Simulations Using Self-Similarity*, Joyce, M., **Garrison, L. H.**, & Eisenstein, D. 2021, MNRAS, 501, 5051
8. *corrfunc—a Suite of Blazing Fast Correlation Functions on the CPU*, Sinha, M., & **Garrison, L. H.** 2020, MNRAS, 491, 3022
7. *Corrfunc: Blazing Fast Correlation Functions with AVX512FSIMD Intrinsics*, Sinha, M., & **Garrison, L. H.** 2018, Workshop on Software Challenges to Exascale Computing, 3

6. *Cosmology with Galaxy-Galaxy Lensing on Non-Perturbative Scales: Emulation Method and Application to BOSS LOWZ*, Wibking, B. D., Weinberg, D. H., Salcedo, A. N., et al. 2020, MNRAS, 492, 2872
5. *Emulating Galaxy Clustering and Galaxy-Galaxy Lensing into the Deeply Non-Linear Regime: Methodology, Information, and Forecasts*, Wibking, B. D., Salcedo, A. N., Weinberg, D. H., et al. 2019, MNRAS, 484, 989
4. *A Hybrid Deep Learning Approach to Cosmological Constraints From Galaxy Redshift Surveys*, Ntampaka, M., Eisenstein, D. J., Yuan, S., & **Garrison, L. H.** 2019, arXiv preprint arXiv:1909.10527
3. *Testing the Detection Significance on the Large-scale Structure by a JWST Deep Field Survey*, Zhang, H., Eisenstein, D. J., **Garrison, L. H.**, & Ferrer, D. W. 2019, The Astrophysical Journal, 875, 132
2. *Exploring the Squeezed Three-Point Galaxy Correlation Function with Generalized Halo Occupation Distribution Models*, Yuan, S., Eisenstein, D. J., & **Garrison, L. H.** 2018, MNRAS, 478, 2019
1. *Using Galaxy Pairs to Investigate the Three-Point Correlation Function in the Squeezed Limit*, Yuan, S., Eisenstein, D. J., & **Garrison, L. H.** 2017, MNRAS, 472, 577

## OUTREACH

- Mentor*, CUNY Hackathon Jan. 2021  
 – Supported weekend hackathon teams at the City University of New York
- Comedian*, Science Riot/New York Academy of Sciences July 2020  
 – Wrote and delivered a short stand-up comedy routine about  $N$ -body cosmology
- Observer*, Harvard Observing Project 2014–2019  
 – Taught undergrads and community members how to make scientific measurements on a telescope (approx. a dozen annual sessions)
- Volunteer*, Cambridge Explores the Universe Summers 2015–2018  
 – Ran CfA outreach activities at the Cambridge Science Festival
- Author*, BiteScis Lesson Plan: Shooting for the Stars March 2018  
 – Created an open-access high school physics lesson plan based on Breakthrough Starshot
- Guest Instructor*, SAO Latino Initiative Summers 2017 – 2019  
 – Lectured and tutored on introductory Python
- Tutor*, Banneker & Aztlán Institute Summer 2017  
 – Tutored on introductory Python and physics

## TEACHING

- Organizer*, SciWare 2020–  
 – Co-organized and taught Flatiron-internal workshops on scientific software best practices
- Instructor*, Software Carpentry since Spring 2021

- Certified instructor for Software Carpentry, a scientific software pedagogy program

*Teaching Fellow*

- PHYS P-17010 *Introduction to Cosmology* Summer 2017
- AST S-35 *Fundamentals of Contemporary Astro.* Summer 2015
- CS 109 *Data Science* Fall 2013

*Lecturer*, Wolbach Library at the Harvard-Smithsonian CfA 2017

- Lecture series on modern Python for astronomy, beginner to expert level