

LEHMAN H. GARRISON

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

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EMPLOYMENT	Flatiron Research Fellow Cosmology X Data Science Group Center for Computational Astrophysics Flatiron Institute, New York, NY	Sept. 2019–present
EDUCATION	Ph.D., Astronomy and Astrophysics <i>Harvard University</i> , Cambridge, MA Thesis: <i>Computational Modeling of Large-Scale Structure with Abacus</i> Advisor: Daniel J. Eisenstein	Aug. 2013–May 2019
	B.A., Astrophysical Sciences (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)	Sept. 2009–June 2013
AWARDS AND HONORS	Eric Keto Prize Best Ph.D. Thesis in Theoretical Astrophysics at Harvard University	April 2019
	Smith Family Graduate Science and Engineering Fellowship <i>Harvard University</i>	2013
	Sigma Xi Book Award Best Senior Thesis in Astronomy at Princeton University	June 2013
PRESS	Astrophysicists Reveal Largest-Ever Suite of Universe Simulations Press release on ABACUS SUMMIT simulations	Oct. 2021
PROFESSIONAL SERVICE	<i>Co-chair</i> , DESI Cosmological Simulations Working Group <i>Builder</i> , DESI Collaboration <i>Referee</i> , MNRAS & ApJ <i>Graduate Student Representative</i> , CfA Library Committee	Oct. 2020– since Dec. 2021 since 2016 2017–2019
SELECTED PUBLICATIONS	First Author Publications 8. <i>Self-similarity of k-nearest neighbor distributions in scale-free simulations</i> , Garrison, L. H. , Abel, T., & Eisenstein, D. J. 2021a, MNRAS, doi: 10.1093/mnras/stab3160 7. <i>The ABACUS cosmological N-body code</i> , Garrison, L. H. , Eisenstein, D. J., Ferrer, D., Maksimova, N. A., & Pinto, P. A. 2021b, MNRAS, 508, 575, doi: 10.1093/mnras/stab2482	

6. *Good and proper: self-similarity of N-body simulations with proper force softening*, **Garrison, L. H.**, Joyce, M., & Eisenstein, D. J. 2021d, MNRAS, 504, 3550, doi: 10.1093/mnras/stab1096
5. *Checkpointing with cp: the POSIX Shared Memory System*, **Garrison, L. H.**, Eisenstein, D. J., & Maksimova, N. A. 2021c, NERSC First International Symposium on Checkpointing for Supercomputing, arXiv:2102.13140. <https://arxiv.org/abs/2102.13140>
4. *Generating approximate halo catalogues for blind challenges in precision cosmology*, **Garrison, L. H.**, & Eisenstein, D. J. 2019, MNRAS, 485, 2407, doi: 10.1093/mnras/stz600
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, doi: 10.1093/mnras/stz634
2. *The Abacus Cosmos: A Suite of Cosmological N-body Simulations*, **Garrison, L. H.**, Eisenstein, D. J., Ferrer, D., et al. 2018, ApJS, 236, 43, doi: 10.3847/1538-4365/aabfd3
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, doi: 10.1093/mnras/stw1594

Contributing Author Publications

17. *The halo light cone catalogues of ABACUSSUMMIT*, Hadzhiyska, B., **Garrison, L. H.**, Eisenstein, D., & Bose, S. 2021, MNRAS, doi: 10.1093/mnras/stab3066
16. *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, MNRAS, doi: 10.1093/mnras/stab3355
15. *Constructing high-fidelity halo merger trees in AbacusSummit*, Bose, S., Eisenstein, D. J., Hadzhiyska, B., **Garrison, L. H.**, & Yuan, S. 2021, submitted, arXiv:2110.11409. <https://arxiv.org/abs/2110.11409>
14. *COMPASO: A new halo finder for competitive assignment to spherical overdensities*, Hadzhiyska, B., Eisenstein, D., Bose, S., **Garrison, L. H.**, & Maksimova, N. 2022, MNRAS, 509, 501, doi: 10.1093/mnras/stab2980
13. *ABACUSSUMMIT: A Massive Set of High-Accuracy, High-Resolution N-Body Simulations*, Maksimova, N. A., **Garrison, L. H.**, Eisenstein, D. J., et al. 2021, MNRAS, doi: 10.1093/mnras/stab2484
12. *Accuracy of power spectrum measurements in dissipationless cosmological simulations*, Maleubre, S., Eisenstein, D., **Garrison, L. H.**, & Joyce, M. 2021, submitted, arXiv:2109.04397. <https://arxiv.org/abs/2109.04397>
11. *Testing dark matter halo properties using self-similarity*, Leroy, M., **Garrison, L.**, Eisenstein, D., Joyce, M., & Maleubre, S. 2021, MNRAS, 501, 5064, doi: 10.1093/mnras/staa3435

10. *Quantifying resolution in cosmological N-body simulations using self-similarity*, Joyce, M., **Garrison, L.**, & Eisenstein, D. 2021, MNRAS, 501, 5051, doi: 10.1093/mnras/staa3434
9. CORRFUNC - *a suite of blazing fast correlation functions on the CPU*, Sinha, M., & **Garrison, L. H.** 2020, MNRAS, 491, 3022, doi: 10.1093/mnras/stz3157
8. *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, doi: 10.1093/mnras/stz3423
7. *A Hybrid Deep Learning Approach to Cosmological Constraints from Galaxy Redshift Surveys*, Ntampaka, M., Eisenstein, D. J., Yuan, S., & **Garrison, L. H.** 2020, ApJ, 889, 151, doi: 10.3847/1538-4357/ab5f5e
6. *KELT-24b: A 5M_J Planet on a 5.6 day Well-aligned Orbit around the Young V = 8.3 F-star HD 93148*, Rodriguez, J. E., Eastman, J. D., Zhou, G., et al. 2019, AJ, 158, 197, doi: 10.3847/1538-3881/ab4136
5. CORRFUNC: *Blazing fast correlation functions with AVX512F SIMD Intrinsics*, Sinha, M., & **Garrison, L. H.** 2019, 3, doi: 10.1007/978-981-13-7729-7_1
4. *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, doi: 10.1093/mnras/sty2258
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, ApJ, 875, 132, doi: 10.3847/1538-4357/ab1268
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, doi: 10.1093/mnras/sty1089
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, doi: 10.1093/mnras/stx2032

OUTREACH

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|---|---|
| <p><i>Mentor</i>, CUNY Hackathon</p> <ul style="list-style-type: none"> – Supported weekend hackathon teams at the City University of New York <p><i>Comedian</i>, Science Riot/New York Academy of Sciences</p> <ul style="list-style-type: none"> – Wrote and delivered a short stand-up comedy routine about <i>N</i>-body cosmology <p><i>Observer</i>, Harvard Observing Project</p> <ul style="list-style-type: none"> – Taught undergrads and community members how to make scientific measurements on a telescope (approx. a dozen annual sessions) <p><i>Volunteer</i>, Cambridge Explores the Universe</p> <ul style="list-style-type: none"> – Ran CfA outreach activities at the Cambridge Science Festival | <p>Jan. 2021</p> <p>July 2020</p> <p>2014–2019</p> <p>Summers 2015–2018</p> |
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	<i>Author</i> , BiteScis Lesson Plan: Shooting for the Stars	March 2018
	– Created an open-access high school physics lesson plan based on Break-through Starshot	
	<i>Guest Instructor</i> , SAO Latino Initiative	Summers 2017 – 2019
	– Lectured and tutored on introductory Python	
	<i>Tutor</i> , Banneker & Aztlán Institute	Summer 2017
	– Tutored on introductory Python and physics	
TEACHING	<i>Organizer</i> , SciWare	2020–
	– Co-organized and taught Flatiron-internal workshops on scientific software best practices (https://sciware.flatironinstitute.org)	
	<i>Instructor</i> , Software Carpentry	since Spring 2021
	– Certified instructor for Software Carpentry, a scientific software pedagogy program	
	<i>Teaching Fellow</i>	
	– PHYS P-17010 <i>Introduction to Cosmology</i>	Summer 2017
	– AST S-35 <i>Fundamentals of Contemporary Astro.</i>	Summer 2015
	– CS 109 <i>Data Science</i>	Fall 2013
	<i>Lecturer</i> , Wolbach Library at CfA Harvard-Smithsonian	2017
	– Lecture series on modern Python for astronomy, beginner to expert level	