

# 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, Cambridge, MA</i> 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, Princeton, NJ</i> 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> Harvard University	2013
	<b>Sigma Xi Book Award</b> Best Senior Thesis in Astronomy at Princeton University	June 2013
PRESS	<b>Astrophysicists Reveal Largest-Ever Suite of Universe Simulations</b> Press release on ABACUS SUMMIT simulations	Oct. 2021
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. 2021a, MNRAS, accepted, arXiv:2109.06991. <a href="https://arxiv.org/abs/2109.06991">https://arxiv.org/abs/2109.06991</a> 7. <i>The ABACUS cosmological N-body code</i> , <b>Garrison, L. H.</b> , 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. 2021b, MNRAS, accepted, arXiv:2110.11413. <https://arxiv.org/abs/2110.11413>
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, submitted, arXiv:2110.11412. <https://arxiv.org/abs/2110.11412>
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. 2021a, MNRAS, accepted, arXiv:2110.11408. <https://arxiv.org/abs/2110.11408>
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<sub>J</sub> 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"> <li>– Supported weekend hackathon teams at the City University of New York</li> </ul> <p><i>Comedian</i>, Science Riot/New York Academy of Sciences</p> <ul style="list-style-type: none"> <li>– Wrote and delivered a short stand-up comedy routine about <i>N</i>-body cosmology</li> </ul> <p><i>Observer</i>, Harvard Observing Project</p> <ul style="list-style-type: none"> <li>– Taught undergrads and community members how to make scientific measurements on a telescope (approx. a dozen annual sessions)</li> </ul> <p><i>Volunteer</i>, Cambridge Explores the Universe</p> <ul style="list-style-type: none"> <li>– Ran CfA outreach activities at the Cambridge Science Festival</li> </ul> | <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	
	<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 the Harvard-Smithsonian CfA	2017
	– Lecture series on modern Python for astronomy, beginner to expert level	