Andrew P. Hearin

242 Nicoll Street, New Haven, CT 06511 • (412) 992-7034
andrew.hearin@yale.edu • http://www.astro.yale.edu/aphearin/Home.html

Education

University of Pittsburgh, Pittsburgh, PA
Ph.D. Physics, 2012

Imperial College of London, London, UK
MSc, Theoretical Physics 2007

University of Massachusetts Amherst, Amherst, MA
M.S. Mathematics, 2005

University of Richmond, Richmond, VA
B.S. Physics, Mathematics, *Summa Cum Laude* 2003

Experience

Yale University, New Haven, CT – *Postdoctoral Fellow (5/2014 - present)*

- Performed self-directed research in astrophysics resulting in 5 first-author publications
- Lead the development of `Halotools`, an open-source python package for studying galaxy evolution using state-of-the-art numerical simulations of cosmology
- Co-advised thesis work of three graduate students, from conceptual development to publication
- Supported a successful three-year NSF grant with technical writing, scientific calculation and generation of accompanying figures
- Optimized parallel Cython code of numerous graduate students and faculty
- Developed HDF5-based simulation data cache management system used by ~ 20 `Halotools` users
- Managed `Halotools` code contributions from over a dozen scientists following best practices of contemporary software development companies
- Coordinated weekly Yale Astronomy Seminar series and Yale Galaxy Lunch talks, arranging schedule for dozens of speakers
- Delivered numerous seminars summarizing my work for both specialized and lay audiences

Fermi National Accelerator Laboratory, Batavia, IL – *Postdoctoral Fellow (9/2012 - 5/2014)*

- Performed self-directed research in astrophysics resulting in 3 first-author publications
- Developed and managed processing pipeline of several Tb of simulation data on the University of Chicago Orion computing cluster

Technical Experience

Scientific Expertise

- Cosmology: gravitational lensing, dark energy, dark matter
- Galaxy Formation: galaxy-halo connection, star-formation and galaxy quenching
- Survey Data Analysis: large-scale structure measurements, galaxy clustering, group identification

Computer Languages & Technical Skills

- Programming Language Fluency in Python (NumPy, SciPy), Cython, IDL, Fortran
- Parallel Programming: OpenMP, Python `multiprocessing`, batch-processing with MPI
- Wrapping C libraries into Python using Cython
- Extensive use of modern project management tools such as distributed version control, unit-testing and Continuous Integration, and automated documentation generation
- Experience with Bayesian statistical methods, designing large-scale data processing pipelines, and numerical/scientific computing techniques

Awards

Yale Center for Astronomy & Astrophysics Prize Postdoctoral Fellow	2014
Fermi National Accelerator Laboratory Postdoctoral Fellow	2012
Pittsburgh Particle Physics, Astrophysics, and Cosmology Center Fellowship	2011
Pittsburgh Zaccheus Daniels Astronomy Fellowship	2010
Imperial College of London Graduation Award, Most Outstanding Masters Thesis	2007
Phi Beta Kappa, University of Richmond	2003
University of Richmond R.E. Loving Award, top graduating physics major	2003
University of Richmond James D. Crump Prize, top graduating math major	2003
University of Richmond Science Scholarship (tuition, room, and board)	1999-2003

Publications

1st author

- Hearin, Andrew P.; Zentner, Andrew R.; van den Bosch, Frank C.; Campbell, Duncan; Tollerud, Erik *Forward Modeling of Large-Scale Structure: An open-source approach with Halotools*, submitted to MNRAS, arXiv:1606.04106
- Hearin, Andrew P.; Zentner, Andrew R.; van den Bosch, Frank C.; Campbell, Duncan; Tollerud, Erik *Introducing Decorated HODs: modeling assembly bias in the galaxy-halo connection*, MNRAS, 460 2552-2570, aug 2016, arXiv:1512.03050
- Hearin, Andrew P.; Behroozi, Peter S.; van den Bosch, Frank C. *On the Physical Origin of Galactic Conformity*, MNRAS, 461, 2135-2145, sep 2015, ArXiv:1504.05578
- A.P. Hearin *Assembly bias and redshift-space distortions: impact on cluster dynamics tests of general relativity*, MNRAS Letters, 451, 45-49, arXiv:1501.02798
- A.P. Hearin, D.F. Watson, & F.C. van den Bosch, *Beyond Halo Mass: Galactic Conformity as a Smoking Gun of Central Galaxy Assembly Bias*, MNRAS, 452, 1958-1969, Arxiv:1404.6524
- A.P. Hearin, D.F. Watson, M. Becker, R. Reyes, A. Berlind, A. Zentner, *The Dark Side of Galaxy Color: new evidence from SDSS clustering and lensing*, MNRAS, 444, 1, 729-743, Arxiv:1310.6747
- A.P. Hearin & D.F. Watson, *The Dark Side of Galaxy Color*, MNRAS, 435, 1313, (2013), Arxiv:1304.5557
- A.P. Hearin, A.R. Zentner, A.A. Berlind, J.A. Newman, *SHAM Beyond Clustering: New tests of galaxy-halo abundance matching with galaxy groups*, MNRAS, 433, 659 (2013), ArXiv:1210.4927
- A.P. Hearin, A.R. Zentner, J.A. Newman, A.A. Berlind, *Mind the gap: tightening the mass-richness relation with magnitude gaps*, MNRAS, 430, 1238 (2013), ArXiv:1207.1074
- A.P. Hearin, C. Gibelyou, A.R. Zentner, *Testing the Origin of the CMB Large-Angle Correlation Deficit with a Galaxy Imaging Survey*, JCAP, 10, 012 (2011), ArXiv:1108.2269
- A.P. Hearin, A.R. Zentner, Z. Ma, *General Requirements on Matter Power Spectrum Predictions for Cosmology with Weak Lensing Tomography*, JCAP 4, 34, (2012), ArXiv:1111.0052
- A.P. Hearin, A.R. Zentner, Z. Ma, D. Huterer, *A General Study of the Influence of Catastrophic Photometric Redshift Errors on Cosmology with Cosmic Shear Tomography,* ApJ, 720, 1351 (2010), ArXiv:1002.3383
- A.P. Hearin, A.R. Zentner, *The Influence of Galaxy Formation Physics on Weak Lensing Tests of General Relativity*, JCAP, 4, 32 (2009), ArXiv:0904.3334

n^{st} author

- Behroozi, P. S., et al., *Using galaxy pairs to probe star formation during major halo mergers*, MNRAS 450, 1546-1564, jun 2015, ArXiv:1502.01342
- Hahn, C., Vakili, M., et al., *Approximate Bayesian Computation in Large Scale Structure: constraining the galaxy-halo connection*, MNRAS, submitted july 2016, ArXiv:1607.01782
- Saito, S., et al., *Connecting massive galaxies to dark matter haloes in BOSS - I. Is galaxy colour a stochastic process in high-mass haloes?*, MNRAS 460, 1457-1475, aug 2016, ArXiv:1509.00482
- Sunayama, T., et al., *The Scale-Dependence of Halo Assembly Bias*, MNRAS 458, 1510-1516, may 2016, ArXiv:1509.06417
- D.F. Watson, A.P. Hearin, et al. *Predicting Galaxy Star Formation Rates via the Co-evolution of Galaxies and Halos*, MNRAS, 446, 1, 651-662, ArXiv:1403.1578

- J.A. Newman et al., *Spectroscopic Needs for Imaging Dark Energy Experiments: Photometric Redshift Training and Calibration*, arXiv:1309.5384
- A.R. Zentner, A.P. Hearin, F.C. van den Bosch, *Assembly Bias and the Galaxy-Halo Relationship*, MNRAS, 443, 4, 3044-3067, arXiv:1311.1818
- van den Bosch, F.C., Jiang, F., Hearin, A.P., Campbell, D., Watson, D. Padmanabhan, N., *How Dark Matter Haloes grow their Potential Wells*, MNRAS, 445, 1713-1730, dec 2014, arXiv:1409.2750
- Eifler, Tim; Krause, Elisabeth; Dodelson, Scott; Zentner, Andrew R.; Hearin, Andrew P.; Gnedin, Nickolay Y. *Accounting for baryonic effects in cosmic shear tomography: determining a minimal set of nuisance parameters using PCA*, MNRAS (2015) 454, 2451-2471, ArXiv:1405.7423
- Campbell, Duncan; van den Bosch, Frank C.; Hearin, Andrew; Padmanabhan, Nikhil; Berlind, Andreas; Mo, H. J.; Tinker, Jeremy; Yang, Xiaohu, *Assessing colour-dependent occupation statistics inferred from galaxy group catalogues* MNRAS (2015), 452, 444-469, arXiv:1505.04798
- Chamberlain, Robert T.; Dalal, Neal; Hearin, Andrew; Ricker, Paul *Probing satellite quenching with galaxy clustering*, MNRAS (2015), 451, 1496-1501, arXiv:1407.2648
- A.R. Zentner, A.P. Hearin, *Asymmetric Dark Matter may alter the evolution of low-mass stars and brown dwarfs*, Phys. Rev. D (2011), 84, 10, ArXiv:1110.5919

Seminar Talks

- University of Chicago cosmology seminar, 5 March, 2016, *Modeling Galaxies in the Era of Precision Cosmology: An open-source approach with Halotools*
- Berkeley cosmology seminar, 23 February, 2016, *Modeling Galaxies in the Era of Precision Cosmology: An open-source approach with Halotools*
- Stanford cosmology seminar, 22 February, 2016, *Modeling Galaxies in the Era of Precision Cosmology: An open-source approach with Halotools*
- Rutgers University Astronomy Department, 20 November, 2014, *Towards a New Picture of the Galaxy-Halo Connection*
- Harvard University Center for Astrophysics, 21 October, 2014, *Galactic Conformity and Galaxy-Halo co-evolution*
- Yale University, 23 September, 2014, *The Dark Side of Galaxy Evolution*
- University of Michigan, 21 April, 2014, *The Dark Side of Galaxy Evolution*
- Kavli IPMU, 8 April, 2014, *The Dark Side of Galaxy Evolution*
- KIPAC at Stanford, 14 January, 2013, *New Probes of the Galaxy-Halo Connection*
- Argonne National Lab, 26 February, 2013, *A Preposterous Theory of Galaxy Evolution*

Conference Talks

- STScI Symposium 2016: What Shapes Galaxies?, 28 April, 2016, *The Galaxy-Halo Connection: Past, Present and Future*
- Python in Astronomy 2016, 24 March, 2016, *Halotools: An open-source python platform for studying galaxy evolution and cosmological structure formation*
- SNOWPAC 2016, 13 March, 2016, *High Precision Modeling of the Galaxy-Halo Connection: A community-driven approach with Halotools*

- The Galaxy-Halo Connection, Aspen Worskhop, 1 September, 2014, *The Physical Connection between Conformity and Assembly Bias*
- Galaxies in the Cosmic Web Workshop, KICP at U. Chicago, 18 June, 2013, *The Dark Side of Galaxy Color*
- COSMO 11 International Conference on Particle Physics & Cosmology, 22-26 August, 2011, *Precision Cosmology with Weak Gravitational Lensing*
- Great Lakes Cosmology Workshop, 14-16 June, 2010, *The Influence of Catastrophic Photo-z Errors on Cosmology with Cosmic Shear*
- Snowbird Workshop on Particle Astrophysics, 23-28 March 2010, *The Influence of Photo-z Errors on Weak Lensing Measurements of Dark Energy*
- Santa Fe Cosmology Workshop, 6-24 July, 2009, *Cosmic Shear Systematics from Photo-z Catastrophes*

Conference Hosting

- Co-organizer with David Weinberg, CCAPP Assembly Bias workshop, 24-25 Nov 2014
- Local Organization Committee, SciCoder workshop at Yale, 1-5 August 2016

Instruction Experience

Yale University

- 2 August 2016: *Training Session Leader*, High-performance scientific computing with Cython
- 5 April 2016: *Training Session Leader*, Building models of the galaxy-halo connection with `Halotools`
- 18-22 January 2016: *Workshop Leader*, Modeling large-scale structure with `Halotools`

University of Pittsburgh

- Fall 2007: *Teaching Assistant*, Basic Physics for Science and Engineering I
- Spring 2008: *Teaching Assistant*, Basic Physics for Science and Engineering II
- Fall 2007: *Teaching Assistant*, Physics 174, Basic Physics for Science and Engineering I
- Spring 2008: *Teaching Assistant*, Physics 175, Basic Physics for Science and Engineering II
- Fall 2009: *Grader*, Astronomy 89, Stars, Galaxies, and the Cosmos

University of Massachusetts

- Fall 2005: *Teaching Assistant*, Math 131: Calculus I
- Spring 2006: *Teaching Assistant*, Math 131: Calculus I
- Fall 2006: *Instructor*, Math 100: Basic Math Skills for the Modern World
- Spring 2007: *Instructor*, Math 100: Basic Math Skills for the Modern World