

# Andrew P. Hearin

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**RESEARCH INTERESTS** Cosmology, theoretical astrophysics, galaxy formation theory, dark matter, dark energy

**EMPLOYMENT** *Assistant Physicist*, September 2017 to present  
Argonne National Laboratory, High Energy Physics Division

*YCAA Prize Postdoctoral Fellow*, May 2014 to May 2017  
Yale University, Physics Department

*Postdoctoral Fellow*, September 2012 to May 2014  
Fermi National Laboratory, Theoretical Astrophysics Group

**EDUCATION** *PhD*, July 2012, Physics & Astronomy  
University of Pittsburgh, Pittsburgh, PA

- Dissertation Advisor: Andrew R. Zentner
- Thesis Topic: Weak Lensing & Galaxy Clustering

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

- Thesis Advisor: Carlo Contaldi
- Thesis Topic: Cosmic Microwave Background Anisotropies

*M.S.*, 2006, Mathematics  
University of Massachusetts, Amherst, MA

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

## AWARDS

### University of Pittsburgh

- Particle Physics, Astrophysics, and Cosmology Center Fellowship, 2011
- Zaccheus Daniel's Astronomy Fellowship, 2010

### Imperial College of London

- Graduation Award, Most Outstanding Master's Thesis, 2007

### University of Richmond

- Ethyl and Albemarle Science Scholar, 1999-2003
- Phi Beta Kappa Member, 2003

- R.E. Loving Award, top graduating physics major, 2003
- James D. Crump Prize, top graduating math major, 2003

**PUBLICATIONS**  
(1<sup>st</sup> author)

- Hearin, A.; Behroozi, P.; Kravtsov, A.; Moster, B. *Clustering Constraints on the Relative Sizes of Central and Satellite Galaxies*, submitted to MNRAS, arXiv:1711.10500
- Hearin, Andrew P.; Campbell, Duncan; Tollerud, Erik; et al. *Forward Modeling of Large-scale Structure: An Open-source Approach with Halotools*, The Astronomical Journal, 154, 190, 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, 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, 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

**PUBLICATIONS**  
( $N^{\text{th}}$  author)

- Behroozi, P.; Wechsler, R.; Hearin, A.; Conroy, C. *UniverseMachine: The Correlation between Galaxy Growth and Dark Matter Halo Assembly from  $z=0-10$* , submitted to MNRAS, arXiv:1806.07893
- Mao, Yao-Yuan, et al.; *DESCQA: An Automated Validation Framework for Synthetic Sky Catalogs*, submitted to MNRAS; arXiv:1709.09665
- Hahn, C.; Vakili, M.; Walsh, K.; Hearin, A. P.; Hogg, D. W.; Campbell, D.; *Approximate Bayesian computation in large-scale structure: constraining the galaxy-halo connection*, MNRAS, 469, 2791-2805, arXiv:1607.01782
- 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*, accepted by MNRAS, awaiting publication, 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**

- UC Santa Cruz cosmology seminar, 20 February, 2017, *Modeling the Evolution of Galaxy Morphology*
- 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*

## CONFERENCE TALKS

- Argonne National Lab, 26 February, 2013, *A Preposterous Theory of Galaxy Evolution*
- LSST-DESC meeting, Carnegie Mellon University, 25 July, 2018, *The cosmoDC2 extragalactic catalog*
- Cosmic Visions Workshop, Lawrence Berkeley National Lab, 15 November, 2017, *Forward-Modeling Cosmological Observables into the Nonlinear Regime*
- The Galaxy–Halo Connection, Kavli Institute of Theoretical Physics, 15 May, 2017, *Galaxy–Halo Modeling of Large-Scale Structure*
- Dark Energy Science Collaboration Meeting, Lawrence Berkeley National Lab, 15 February, 2017, *Stage IV Cosmology in the Presence Assembly Bias*
- The Galaxy-Halo Connection, Aspen Workshop, 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*

## INSTRUCTION EXPERIENCE

### 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