

XIAO FANG

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EMPLOYMENT

BCCP Fellow 08/2021 -
Berkeley Center For Cosmological Physics, Dept. of Physics, UC Berkeley

Postdoctoral Research Associate 09/2018 - 08/2021
Dept. of Astronomy & Steward Observatory, University of Arizona

EDUCATION

Ph.D. in Physics, The Ohio State University; Advisor: *Christopher Hirata* 08/2018
Thesis: *Perturbation Theories in Astrophysics: From Large-Scale Structure To Compact Objects*

B.Sc. in Physics, Nankai University, China 06/2013

RESEARCH INTERESTS

Survey Cosmology: large-scale structure, weak lensing, joint-probe analyses, perturbation theory;
Astrophysics: compact objects, SN Ia progenitors, gravitational waves, dark matter candidates.

COLLABORATION

Full Member: V. Rubin Observatory LSST-DESC
Member: DES, DESI, and Roman Space Telescope

SELECTED RECENT INVITED TALKS

(40 scientific presentations in total since 2016)

10. Invited Talk, LSST-DESC Weak Lensing Group Telecon 10/2021
9. Invited Talk, NASA-Roman Space Telescope SIT Telecon 09/2021
8. Invited Talk, Princeton/IAS Cosmology Lunch, Princeton, NJ 10/2020
7. Invited Talk, LSST-DESC Virtual Collaboration Meeting 07/2020
6. Invited Talk, Astro Coffee, Tsinghua University, Beijing, China 04/2020
5. Invited Seminar, Cosmology Seminar, Arizona State University, AZ 04/2020
4. Invited Seminar, Astro Lunch Seminar, Kavli IMPU, University of Tokyo, Japan 04/2020
3. Invited Seminar, Astronomy Colloquium, Shanghai Jiao Tong University, Shanghai, China 03/2020
2. Invited Seminar, Duke Cosmology Group, Durham, NC 02/2020
1. Invited Talk, NASA-WFIRST Science Telecon Talk Series 09/2019

TEACHING EXPERIENCE & SERVICE

Referee: PRL, PRD, A&A, MNRAS, JCAP, Universe, Open Journal of Astrophysics

Host, Sprint Day of LSST-DESC Collaboration Meeting 2020.01

Coordinator, Tuesday Astrophysics and Cosmology Seminar, U. of Arizona 2018-2020

Coordinator, Cosmology Lunch Journal Club, CCAPP, OSU 2016-2018

Teaching Associate, Physics 1250, *Mech, Thermo, Waves*, OSU 2 semesters, 2014-2015

Grader, Physics 2301, *Intermediate Mechanics*, OSU 2 semesters, 2013-2014

Co-organizer, Astronomical Society of Nankai University 2010-2012

AWARDS & HONERS

China Scholarship for Visiting Students , China Scholarship Council	2012 - 2013
6-month study at Heidelberg University, Germany, Host: Luca Amendola	
National Astronomical Observatories Scholarship , Chinese Academy of Sciences	2011
University Scholarships , Nankai University	2010 - 2011
Asian-Pacific Astronomy Olympiad : 1 st Diploma	2005
China National Astronomy Olympiad : 2 nd prize	2005

OUTREACH

Volunteer, FOSAA (Friends of Ohio State Astronomy and Astrophysics), OSU	05/2018
Poster, OSU Physics Graduate Studies Open House	03/2018
Volunteer, TeVPA 2017 Conference, Columbus, OH	08/2017
Volunteer, Ohio Supercomputer Center's Summer Institute, Columbus, OH	06/2017
Volunteer, FOSAA (Friends of Ohio State Astronomy and Astrophysics), OSU	05/2017
Poster, OSU Physics Graduate Studies Open House	03/2017
Volunteer, the Global Star Party, Columbus, OH	04/2016
Poster, OSU Physics Graduate Studies Open House	03/2016
Speaker, Innis Elementary School's annual Science Day, Columbus, OH	12/2015
Organizer, Public Science Activities held by Astronomical Society of Nankai University	2010-2012

REFERENCES

Prof. Christopher Hirata <i>Dept. of Physics and Astronomy, The Ohio State University</i>	<i>hirata.10@osu.edu</i>
Prof. Todd Thompson <i>Dept. of Astronomy, The Ohio State University</i>	<i>thompson.1847@osu.edu</i>
Prof. Tim Eifler <i>Dept. of Astronomy and Steward Observatory, University of Arizona</i>	<i>timeifler@arizona.edu</i>
Prof. Elisabeth Krause <i>Dept. of Astronomy and Steward Observatory, University of Arizona</i>	<i>krausee@arizona.edu</i>
Prof. Bhuvnesh Jain <i>Dept. of Physics and Astronomy, University of Pennsylvania</i>	<i>bjain@physics.upenn.edu</i>
Prof. Michael Troxel <i>Dept. of Physics, Duke University</i>	<i>michael.troxel@duke.edu</i>
Prof. John Beacom <i>Dept. of Physics and Astronomy, The Ohio State University</i>	<i>beacom.7@osu.edu</i>

PUBLICATIONS - REFEREED

23. M. Moreira, F. Andrade-Oliveira, **X. Fang** et al., *Mitigating baryonic effects with a theoretical error covariance*, MNRAS, 507, 4 (2021)
22. [DES] F. Andrade-Oliveira et al., *Galaxy Clustering in Harmonic Space from the Dark Energy Survey Year 1 Data: Compatibility with Real-Space Results*, MNRAS, 505, 4 (2021)
21. [DES] O. Friedrich et al., *Dark Energy Survey Year 3 Results: Covariance Modelling and its Impact on Parameter Estimation and Quality of Fit*, MNRAS, 508, 3 (2021)
20. E. Massara, S. Ho, C. Hirata, J. DeRose, R. Wechsler, **X. Fang**, *Line confusion in spectroscopic surveys and its possible effects: Shifts in Baryon Acoustic Oscillations position*, MNRAS, 508, 3 (2021)
19. [DES] C. To et al., *Dark Energy Survey Year 1 Results: Cosmological Constraints from Cluster Abundances, Weak Lensing, and Galaxy Correlations*, PRL, 126, 141301 (2021)
18. T. Eifler et al., *Cosmology with the Roman Space Telescope – multiprobe strategies*, MNRAS, 507, 2 (2021)
17. [DES] C. Doux et al., *Consistency of cosmic shear analyses in harmonic and real space*, MNRAS, 503, 3 (2021)
16. [DES] A. Porredon et al., *Dark Energy Survey Year 3 Results: Optimizing the Lens Sample in Combined Galaxy Clustering and Galaxy-Galaxy Lensing Analysis*, PRD, 103, 043503 (2021)
15. [DES] E. Wagoner, E. Rozo, **X. Fang**, M. Crocce, J. Elvin-Poole, N. Waverdyck, *Linear Systematics Mitigation in Galaxy Clustering in the Dark Energy Survey Year 1 Data*, MNRAS, 503, 3 (2021)
14. [DES] S. Pandey et al., *Perturbation theory for modeling galaxy bias: validation with simulations of the Dark Energy Survey*, PRD, 102, 123522 (2020)
13. [DES] H. Huang et al., *Dark Energy Survey Year 1 Results: Constraining Baryonic Physics in the Universe*, MNRAS, 502, 4 (2021)
12. T. Eifler et al., *Cosmology with the Roman Space Telescope – synergies with the Rubin Observatory Legacy Survey of Space and Time*, MNRAS, 507, 1 (2021)
11. **X. Fang**, T. Eifler, E. Krause, *2D-FFTLog: Efficient computation of real space covariance matrices for galaxy clustering and weak lensing*, MNRAS, 497, 3 (2020)
10. **X. Fang**, E. Krause, T. Eifler, N. MacCrann, *Beyond Limber: Efficient computation of angular power spectra for galaxy clustering and weak lensing*, JCAP, 05, 010 (2020)
9. P. Montero, **X. Fang**, G. Vasquez, M. Silva, C. Hirata, *Revisiting constraints on asteroid-mass primordial black holes as dark matter candidates*, JCAP, 08, 031 (2019)
8. **X. Fang**, T. Thompson, C. Hirata, *The Population of Eccentric Binary Black Holes: Implications for mHz Gravitational Wave Experiments*, ApJ, 875, 75 (2019)
7. D. Martens, **X. Fang**, M. Troxel, J. DeRose, C. Hirata, R. Wechsler, Y. Wang, *Effects of NII and H α Line Blending on the WFIRST Galaxy Redshift Survey*, MNRAS, 485, 1 (2019)
6. D. Martens, C. Hirata, A. Ross, **X. Fang**, *A Radial Measurement of the Galaxy Tidal Alignment Magnitude with BOSS Data*, MNRAS, 478, 1 (2018)

5. **X. Fang**, T. Thompson, C. Hirata, *Dynamics of Quadruple Systems Composed of Two Binaries: Stars, White Dwarfs, and Implications for Ia Supernovae*, MNRAS 476, 3 (2018)
4. J. Blazek, N. MacCrann, M. Troxel, **X. Fang**, *Beyond linear galaxy alignments*, PRD, 100, 103506 (2019)
3. **X. Fang**, J. Blazek, J. McEwen, C. Hirata, *FAST-PT II: an algorithm to calculate convolution integrals of general tensor quantities in cosmological perturbation theory*, JCAP, 02, 030 (2017)
2. V. Gluscevic, T. Venumadhav, **X. Fang**, C. Hirata, A. Oklopčić, A. Mishra, *A new probe of magnetic fields in the pre-reionization epoch: II. Detectability*, PRD, 95, 083011 (2017)
1. J. McEwen, **X. Fang**, C. Hirata, J. Blazek, *FAST-PT: a novel algorithm to calculate convolution integrals in cosmological perturbation theory*, JCAP, 09, 015 (2016)

PRE-PRINTS

17. [DES] J. Cordero, *et al.*, *Dark Energy Survey Year 3 results: Marginalisation over redshift distribution uncertainties using ranking of discrete realisations*, [arXiv:2109.09636]
16. [DES] S. Pandey, *et al.*, *Cross-correlation of DES Y3 lensing and ACT/Planck thermal Sunyaev Zel'dovich Effect II: Modeling and constraints on halo pressure profiles*, [arXiv:2108.01601]
15. [DES] M. Gatti, *et al.*, *Cross-correlation of DES Y3 lensing and ACT/Planck thermal Sunyaev Zel'dovich Effect I: Measurements, systematics tests, and feedback model constraints*, [arXiv:2108.01600]
14. **X. Fang**, T. Eifler, E. Schaan, H. Huang, E. Krause, S. Ferraro, *Cosmology from Clustering, Cosmic Shear, CMB Lensing, and Cross Correlations: Combining Rubin Observatory and Simons Observatory*, [arXiv:2108.00658]
13. [DES] T. Abbott, *et al.*, *Dark Energy Survey Year 3 Results: A 2.7% measurement of Baryon Acoustic Oscillation distance scale at redshift 0.835*, [arXiv:2107.04646]
12. [DES] I. Ferrero, *et al.*, *Dark Energy Survey Year 3 Results: Galaxy mock catalogs for BAO analysis*, [arXiv:2107.04602]
11. [DES] L. Secco, *et al.*, *Dark Energy Survey Year 3 Results: Cosmology from Cosmic Shear and Robustness to Modeling Uncertainty*, [arXiv:2105.13544]
10. [DES] C. Sánchez, *et al.*, *Dark Energy Survey Year 3 Results: Exploiting small-scale information with lensing shear ratios*, [arXiv:2105.13542]
9. [DES] T. Abbott, *et al.*, *Dark Energy Survey Year 3 Results: Cosmological Constraints from Galaxy Clustering and Weak Lensing*, [arXiv:2105.13549]
8. [DES] M. Rodríguez-Monroy, *et al.*, *Dark Energy Survey Year 3 Results: Galaxy clustering and systematics treatment for lens galaxy samples*, [arXiv:2105.13540]
7. [DES] S. Pandey, *et al.*, *Dark Energy Survey Year 3 Results: Constraints on cosmological parameters and galaxy bias models from galaxy clustering and galaxy-galaxy lensing using the redMaGiC sample*, [arXiv:2105.13545]
6. [DES] A. Porredon, *et al.*, *Dark Energy Survey Year 3 results: Cosmological constraints from galaxy clustering and galaxy-galaxy lensing using the MagLim lens sample*, [arXiv:2105.13546]
5. [DES] J. DeRose, *et al.*, *Dark Energy Survey Year 3 results: cosmology from combined galaxy clustering and lensing – validation on cosmological simulations*, [arXiv:2105.13547]

4. [DES] J. Prat, *et al.*, *Dark Energy Survey Year 3 Results: High-precision measurement and modeling of galaxy-galaxy lensing*, [arXiv:2105.13541]
3. [DES] A. Amon, *et al.*, *Dark Energy Survey Year 3 Results: Cosmology from Cosmic Shear and Robustness to Data Calibration*, [arXiv:2105.13543]
2. [DES] K. Krause, **X. Fang** *et al.*, *Dark Energy Survey Year 3 Results: Multi-Probe Modeling Strategy and Validation*, [arXiv:2105.13548]
1. E. Huff, E. Krause, T. Eifler, **X. Fang**, M. George, D. Schlegel, *Kinematic Lensing - Cosmic shear without shape noise*, [arXiv:1311.1489]

WHITE PAPERS

3. T. Eifler *et al.*, *Partnering space and ground observatories - Synergies in cosmology from LSST and WFIRST*, BAAS, 51, 3, 418 (2019)
2. O. Doré *et al.*, *WFIRST: The Essential Cosmology Space Observatory for the Coming Decade*, BAAS, 51, 3, 341 (2019) [arXiv:1904.01174]
1. R. Akeson *et al.*, *The Wide Field Infrared Survey Telescope: 100 Hubbles for the 2020s*, [arXiv:1902.05569]

SOFTWARES

5. Core developer of **CosmoLike**: a software framework for complex likelihood analyses of cosmological surveys and one of the two DES analysis pipelines.
4. **CosmoCov**: a package for computing the real space covariances of galaxy clustering and weak lensing for imaging galaxy surveys.
3. **2D-FFTLog**: A 2D version of FFTLog algorithm, a numerically stable, accurate and efficient way of transforming Fourier space covariance to real space.
2. **FFTLog-and-Beyond**: A generalized FFTLog algorithm for efficient computation of integrals containing a Bessel function, or its n -th order derivative. Useful for computing accurate projected 2-point functions in imaging galaxy surveys.
1. **FAST-PT** and **CFASTPT**: Python and C versions of the FAST-PT algorithm for efficient computation of convolutional integrals in cosmological perturbation theories