Chihway Chang

CONTACT INFORMATION

The University of Chicago
The Kavli Institute for Cosmological Physics
William Eckhardt Research Center 427
5640 South Ellis Avenue
Chicago, IL 60637, USA

Work: +1-773-702-4314
E-mail: chihway@kicp.uchicago.edu
WWW: https://chihway.github.io

RESEARCH INTERESTS

Survey science: cosmology from galaxy surveys and combining with CMB experiments

Weak lensing: wide-field mass reconstruction, galaxy-galaxy lensing, systematic effects

Galaxy-halo connection: small-scale physics and systematics, galaxy evolution

Image simulation: forward modelling of wide-field imaging and spectroscopic data

Instrumentation: CCD sensor characterization and metrology

ACADEMIC APPOINTMENTS

The Kavli Institute for Cosmological Physics (KICP), University of Chicago

KICP Fellow — October 2016 – present

Institute of Astronomy, ETH Zurich

Postdoctoral Researcher — September 2013 – September 2016

Advisor: Alexandre Refregier

EDUCATION

Physics Department, Stanford University

Ph.D., Department of Physics — June 2013

- Thesis Topic: *Systematic Effects in Weak Lensing Measurements for Future Optical Surveys*
- Advisers: Prof. Steven M. Kahn & Prof. Rafe H. Schindler

Physics Department, National Taiwan University

B.S., Department of Physics — June 2007

AWARDS

Editor's choice in Physical Review Letters — 2015

Our paper *Wide-Field Lensing Mass Maps from DES Science Verification Data* was selected and featured on the cover of PRL issue 115. The paper was also presented at the APS press release in April 2015 and covered in a number of scientific and public media.

62nd Meeting of Nobel Laureate, Lindau, Germany — 2012

Nominated by the USA to attend.

COLLABORATIONS

The Dark Energy Survey (DES) — 2013 – present

Co-convener of the weak lensing mass mapping working group. Member of the science working groups: weak lensing, large-scale structure, simulation.

The 3rd GRavitational lEnsing Accuracy Testing challenge — 2012 – 2013

Organization team.

The Large Synoptics Survey Telescope (LSST) — 2010 – 2013

Member of the science working groups: weak lensing, simulation. Member of the LSST Dark Energy Science Collaboration. Member of the LSST camera team.

SELECTED TALKS

Cosmology Seminar, BNL, NY, USA — Sep 14, 2017

Instrumentation Seminar, BNL, NY, USA — Sep 13, 2017

The Nonlinear Universe, Smartno, Slovenia — July 20, 2017

Invited Talk at Fermilab 50th User Meeting, Fermilab, IL, USA — June 8, 2017

KICP Colloquium, KICP, IL, USA — May 31, 2017

Astronomy Chalk Talk, U of Chicago, IL, USA — January 24, 2017
Cosmology Seminar, UCL, London, UK — December 21, 2016
Astronomy Colloquium, UIUC, IL, USA — November 1, 2016
KICP Friday Seminar, KICP, IL, USA — October 7, 2016
Cosmology Seminar, KIPAC, CA, USA — May 16, 2016
Kosmologietag Invited Speaker, Bielefeld University, Germany — April 29, 2016
Astronophysics Colloquium, ASIAA, Taipei, Taiwan — March 28, 2016
RAS Specialist Discussion Meeting, London, UK — February 12, 2016
Swiss Python Summit, Rapperswil, Switzerland — February 5, 2016
Astrophysics Seminar, Rutgers University, NJ, USA — August 11, 2015
Cosmology Lunch, Princeton University, NY, USA — August 10, 2015
Fourteenth Marcel Grossmann Meeting (MG14), Rome, Italy — July 17, 2015
APS April meeting, Baltimore, MD, USA — April 14, 2015
Weekly Colloquium, IEEC-CSIC, Barcelona, Spain — October 8, 2014
Astrophysics Seminar, ASIAA, Taipei, Taiwan — September 19, 2014
Research Seminar Shanghai Jiao Tong University, Shanghai, China — September 9, 2014
DES-LSST Joint Workshop, Fermilab, IL, USA — March 24, 2014
Swiss Cosmology Day, ETH Zurich, Switzerland — February 6, 2014
ETH Research Seminar, ETH Zurich, Zurich, Switzerland — September 19, 2013
Astrophysics Seminar, JPL, CA, USA — September 2012
Special Seminar, IPMU, Tokyo, Japan — August 2012
SnowPAC, Snowbird, CO, USA — March 22, 2012

Student Mentoring

Dimitrios Tanoglidis: PhD student at KICP, Summer 2017 – present
Rebecca Chen: undergraduate student at KICP, Winter 2016 – present
Gourav Khullar: PhD student at KICP, Winter 2016 – present
Giulia Chirivi: undergraduate student at ETH Zurich, Fall 2015
Fabienne Dahinden: undergraduate student at ETH Zurich, Spring 2015
Sebastian Gaebel: master student at ETH Zurich, Spring 2014

Teaching and Outreach

KICP

Volunteer at the Adler Planetarium: *Astronomy Conversations* — 2016 – present

ETH Zurich

Astrophysics I: *Substitute Lecturer* — Fall 2015, Fall 2014
Astrowoche: *Teaching Assistant* — Spring 2016, Spring 2015
Cosmological Probes: *Teaching Assistant and Substitute Lecturer* — Spring 2014

Stanford University / SLAC National Accelerator Laboratory

Physics 21, Mechanics and Heat: *Teaching Assistant* — Fall 2011
Physics 23, Electricity and Optics: *Teaching Assistant* — Winter 2007
Physics 41, Light and Heat: *Teaching Assistant* — Fall 2007
SLAC tour guide — 2010 – 2013

REFERENCES

Prof. Joshua A. Frieman (frieman@fnal.gov; +1-630-840-2226; +1-773-702-7971)
- Professor of Astronomy & Astrophysics and KICP, University of Chicago
- Senior staff member in the Theoretical Astrophysics group at Fermilab
- Director of the Dark Energy Survey (DES)

Prof. Steven M. Kahn (skahn@slac.stanford.edu; +1-650-926-4622)
- Professor of Physics Department, Stanford University
- Director of the Large Synoptic Survey Telescope (LSST)

Prof. Scott Dodelson (sdodelso@andrew.cmu.edu; +1-412-268-5432)
- Professor and Department Head of Physics, Carnegie Mellon University

Prof. Bhuvnesh Jain (bjain@physics.upenn.edu; +1-215-573-5330)
- Professor of Physics and Astronomy Department, University of Pennsylvania

Publication List

Submitted Journal Publications

35. **C. Chang**, A. Pujol, B. Mawdsley, D. Bacon, J. Elvin-Poole, et al., *Dark Energy Survey Year 1 Results: Curved-Sky Weak Lensing Mass Map*. ArXiv e-prints (2017) 1708.01535.

34. T. M. C. Abbott, ...**C. Chang** et al., *Dark Energy Survey Year 1 Results: Cosmological Constraints from Galaxy Clustering and Weak Lensing*. ArXiv e-prints (2017) 1708.01530.

33. B. Hoyle, ...**C. Chang** et al., *Dark Energy Survey Year 1 Results: Redshift Distributions of the Weak Lensing Source Galaxies*. ArXiv e-prints (2017) 1708.01532.

32. J. Prat, ...**C. Chang** et al., *Dark Energy Survey Year 1 Results: Galaxy-Galaxy Lensing*. ArXiv e-prints (2017) 1708.01537.

31. M. A. Troxel, ...**C. Chang** et al., *Dark Energy Survey Year 1 Results: Cosmological Constraints from Cosmic Shear*. ArXiv e-prints (2017) 1708.01538.

30. E. Krause, ...**C. Chang** et al., *Dark Energy Survey Year 1 Results: Multi-Probe Methodology and Simulated Likelihood Analyses*. ArXiv e-prints (2017) 1706.09359.

Refereed Journal Publications

29. E. Baxter, **C. Chang**, B. Jain, S. Adhikari, N. Dalal et al., *The Halo Boundary of Galaxy Clusters in the SDSS*. ApJ **841**, 18 (2017) 1702.01722.

28. J. Akeret, **C. Chang**, A. Lucchi, A. Refregier, *Radio Frequency Interference Mitigation using Deep Convolutional Neural Networks*. A&C **18**, 35–39 (2017) 1609.09077.

27. J. Akeret, S. Seehars, **C. Chang**, C. Monstein, A. Amara, A. Refregier, *HIDE & SEEK: End-to-End Packages to Simulate and Process Radio Survey Data*. A&C **18**, 8–17 (2017) 1607.07443.

26. **C. Chang**, C. Monstein, J. Akeret, S. Seehars, A. Refregier et al., *An Integrated System at the Bleien Observatory for Mapping the Galaxy*. MNRAS **464**, 1727–1737 (2017) 1607.07451.

25. N. MacCrann, ...**C. Chang** et al., *Inference from the Small Scales of Cosmic Shear with Current and Future Dark Energy Survey Data*. MNRAS **465**, 2567–2583 (2017). 1608.01838.

24. L. Clerkin, ...**C. Chang** et al., *Testing the Lognormality of the Galaxy and Weak Lensing Convergence Distributions from Dark Energy Survey Maps*. MNRAS **466**, 1444–1461 (2017). 1605.02036.

23. T. Kacprzak, ... **C. Chang**..., et al., *Cosmology Constraints from Shear Peak Statistics in Dark Energy Survey Science Verification Data*. MNRAS **463**, 3653–3673 (2016), 1603.05040.

22. B. Nord, ... **C. Chang**..., et al., *SPOKES: An End-to-End Simulation Facility for Spectroscopic Cosmological Surveys*. A&C **15**, 1–15 (2016), 1602.01480.

21. D. Kirk, Y. Omori, A. Benoit-Levy, R. Cawton, **C. Chang** et al., *Cross-correlation of Gravitational Lensing from DES Science Verification, SPT and Planck*. MNRAS **459**, 21 (2016), 1512.04535.

20. A. Pujol, **C. Chang**, E. Gazganaga, A. Amara, A. Refregier et al., *A New Method to Measure Galaxy Bias from the Density and Weak Lensing Fields*. MNRAS **462**, 35–47 (2016) 1601.00160.

19. **C. Chang**, A. Pujol, E. Gazganaga, A. Amara, A. Refregier et al., *Galaxy Bias from the DES Science Verification Data: Combining Galaxy Density Maps and Weak Lensing Maps*. MNRAS **459**, 3203 (2016), 1601.00405.

18. The Dark Energy Survey Collaboration .. **C. Chang**..., et al., *Cosmology from Cosmic Shear with DES Science Verification Data*. PRD **94**, 022001 (2016), 1507.05552.

17. M. Jarvis, ... **C. Chang**..., et al., *The DES Science Verification Weak Lensing Shear Catalogs*. MNRAS **460**, 2245 (2016), 1507.05603.

16. M.R. Becker, ... **C. Chang**..., et al., *Cosmic Shear Measurements with DES Science Verification Data*. PRD **94**, 022002 (2016), 1507.05598.

15. B. Leistedt, ... **C. Chang**..., et al., *Mapping and Simulating Systematics due to Spatially-Varying Observing Conditions in DES Science Verification Data*. ApJS **226**, 24 (2016), 1507.05647.

14. C. Bonnett, ... **C. Chang**..., et al., *Redshift Distributions of Galaxies in the DES Science Verification Shear Catalogue and Implications for Weak Lensing* PRD **94**, 042005 (2016), 1507.05909.

13. C. Bruderer, **C. Chang**, A. Refregier, A. Amara, J. Berge et al., *Calibrated Ultra Fast Image Simulations for the Dark Energy Survey*. ApJ **817**, 25 (2016), 1504.02778.

12. **C. Chang**, C. Monstein, A. Refregier, A. Amara, A. Glauser et al., *Beam Calibration of Radio Telescopes with Drones*. PASP **127**, 1131–1143, (2015), 1505.05885.

11. **C. Chang**, V. Vikram, B. Jain, D. Bacon, A. Amara et al., *Wide-Field Lensing Mass Maps from DES Science Verification Data*. PRL **115**, 051301 (2015), 1505.01871.

10. V. Vikram, **C. Chang**, B. Jain, D. Bacon, A. Amara et al., *Wide-Field Lensing Mass Maps from DES Science Verification Data: Methodology and Detailed Analysis*. PRD **92**, 022006 (2015), 1504.03002.

9. J.R. Peterson, ... **C. Chang**... et al., *Simulation of Astronomical Images from Optical Survey Telescopes using a Comprehensive Photon Monte Carlo Approach*. ApJS **218**, 14 (2015), 1504.06570.

8. **C. Chang**, M.T. Busha, R.H. Wechsler, A. Refregier, A. Amara et al., *Modelling the Transfer Function for the Dark Energy Survey*. ApJ **801**, 73 (2015), 1411.0032.

7. **C. Chang** and B. Jain, *Delensing Galaxy Surveys*. MNRAS **443**, 102 (2014), 1405.1432.

6. R. Mandelbaum, B. Rowe, J. Bosch, **C. Chang**, F. Courbin et al., *The Third Gravitational Lensing Accuracy Testing (GREAT3) Challenge Handbook*. ApJS **212**, 5 (2014), 1308.4982.

5. **C. Chang**, M. Jarvis, B. Jain, S.M. Kahn, D. Kirkby et al., *The Effective Number Density of Galaxies for Weak Lensing Measurements in the LSST Project*. MNRAS **434**, 2121 (2013), 1305.0793.

4. D. Bard, J.M. Kratochvil, **C. Chang**, M. May, S.M. Kahn et al., *Effect of Measurement Errors on Predicted Cosmological Constraints from Shear Peak Statistics with LSST*. ApJ **774**, 49 (2013), 1301.0830.

3. **C. Chang**, S.M. Kahn, J.G. Jernigan, J.R. Peterson, Y. AlSayyad et al., *Spurious Shear in Weak Lensing with LSST*. MNRAS **428**, 2695 (2013), 1206.1378.

2. **C. Chang**, P.J. Marshall, J.G. Jernigan, J.R. Peterson, S.M. Kahn et al., *Atmospheric PSF Interpolation for Weak Lensing in Short Exposure Imaging Data*. MNRAS **427**, 2572 (2012), 1206.1383.

1. J. Singal, R. Schindler, **C. Chang**, P. Czodrowski, and P. Kim, *A Multi-Chamber System for Analyzing the Outgassing, Deposition, and Associated Optical Degradation Properties of Materials in a Vacuum*. Review of Scientific Instruments **81**, 025101 (2010), 0910.4198.

ARXIV E-PRINTS, CONFERENCE PROCEEDINGS, POSTERS

9. The LSST Dark Energy Science Collaboration, *LSST Dark Energy Science Collaboration*. ArXiv e-prints (2012) 1211.0310.
8. J.R. Peterson, ... **C. Chang**..., et al., *LSST Image Simulations*. American Astronomical Society Meeting Abstracts, **219**, (2012).
7. A. Bradshaw, ... **C. Chang**..., et al., *LSST Probes of Dark Energy: New Energy vs New Gravity*. American Astronomical Society Meeting Abstracts, **219**, (2012).
6. R.R. Gibson, ... **C. Chang**..., et al., *A Framework for End to End Simulations of the Large Synoptic Survey Telescope*. Astronomical Data Analysis Software and Systems XX, **442**, p.329, (2011).
5. J. Pizagno, ... **C. Chang**..., et al., *Strong Lenses with LSST: Simulated 10-year Movies of Multiply-Imaged Quasars*. American Astronomical Society Meeting Abstracts, **217**, (2011).
4. **C. Chang**, S.M Kahn, G. Jernigan, J.R. Peterson, A. Rasmussen et al., *Shear Systematics in LSST Simulated Images*. American Astronomical Society Meeting Abstracts, **217**, (2011).
3. G. Jernigan, ... **C. Chang**..., et al., *Strong Lenses with LSST: Simulated 10-year Movies of Multiply-Imaged Quasars*. American Astronomical Society Meeting Abstracts, **217**, (2011).
2. K.S. Krughoff, ... **C. Chang**..., et al., *Strong Lenses with LSST: Simulated 10-year Movies of Multiply-Imaged Quasars*. American Astronomical Society Meeting Abstracts, **217**, (2011).
1. A. Connolly, ... **C. Chang**..., et al., *Simulating the LSST system*. Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series **7738**, p.1, (2010). SPIE.

JOURNAL PUBLICATIONS IN PREPARATION

2. **C. Chang**, E. Baxter, B. Jain, C. Sanchez et al., *The Splashback Feature around DES Galaxy Clusters: Galaxy Density and Weak Lensing Profiles*.
1. W. Hartley, **C. Chang** et al., *Spectroscopic Incompleteness in Dark Energy Experiments*.