Chihway Chang

CONTACT INFORMATION

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RESEARCH INTERESTS

Survey science: cosmology from galaxy surveys, CMB, H_I intensity mapping

Weak lensing: wide-field mass reconstruction, cross-correlation

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

Image simulation: forward modelling of imaging and spectroscopic data

Instrumentation: CCD sensor characterization

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

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

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 South Pole Telescope (SPT) — 2016 – present
Member of the DES-SPT cross-correlation analysis group.

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 Large Synoptics Survey Telescope (LSST) — 2010 – present
Member of the LSST Dark Energy Science Collaboration (DESC). Coordinator of the DESC weak lensing pipeline project. Member of the LSST camera team.

Selected Talks

Fermilab Astro Seminar, Fermilab, IL, USA	October 23, 2017
Astro/Cosmology Seminar, CMU, PA, USA	October 13, 2017
Astrophysics and Cosmology Seminar, UIUC, IL, USA	September 20, 2017
Cosmology Seminar, BNL, NY, USA	September 14, 2017
Instrumentation Seminar, BNL, NY, USA	September 13, 2017
The Nonlinear Universe, Smartno, Slovenia	July 20, 2017
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 Overview Talk, 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

39. **C. Chang**, E. Baxter, B. Jain, C. Sanchez et al., *The Splashback Feature around DES Galaxy Clusters: Galaxy Density and Weak Lensing Profiles*. ArXiv e-prints (2017) 1710.06808.

38. O. Friedrich, ...**C. Chang** et al., *Density split statistics: joint model of counts and lensing in cells*. ArXiv e-prints (2017) 1710.05162.

37. D. Gruen, ...**C. Chang** et al., *Density split statistics: Cosmological constraints from counts and lensing in cells in DES Y1 and SDSS*. ArXiv e-prints (2017) 1710.05045.

36. M. Gatti, ...**C. Chang** et al., *Dark Energy Survey Year 1 Results: Cross-Correlation Redshifts - Methods and Systematics Characterization*. ArXiv e-prints (2017) 1709.00992.

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. W. Hartley, **C. Chang** et al., *Spectroscopic Incompleteness in Dark Energy Experiments*.

1. N. Jeffrey,... **C. Chang**..., et al., *Comparison of Convergence Reconstruction Methods with DES SV*.