

## Chihway Chang

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| CONTACT INFORMATION   | <b>The University of Chicago</b><br><b>The Kavli Institute for Cosmological Physics</b><br>William Eckhardt Research Center 427<br>5640 South Ellis Avenue<br>Chicago, IL 60637, USA  | <i>Work:</i> +1-773-702-4314<br><i>E-mail:</i> <a href="mailto:chihway@kicp.uchicago.edu">chihway@kicp.uchicago.edu</a><br><i>WWW:</i> <a href="https://chihway.github.io">https://chihway.github.io</a> |
| RESEARCH INTERESTS    | <b>Survey science:</b> cosmology from galaxy surveys, CMB, and H <sub>I</sub> intensity mapping<br><b>Weak lensing:</b> wide-field mass reconstruction, galaxy-galaxy lensing, systematic effects<br><b>Galaxy-halo connection:</b> small-scale physics and systematics, galaxy evolution<br><b>Image simulation:</b> forward modelling of wide-field imaging and spectroscopic data<br><b>Instrumentation:</b> CCD sensor characterization   |  |
| ACADEMIC APPOINTMENTS | <b>The Kavli Institute for Cosmological Physics (KICP), University of Chicago</b><br>KICP Fellow<br>October 2016 – present<br><br><b>Institute of Astronomy, ETH Zurich</b><br>Postdoctoral Researcher<br>September 2013 – September 2016<br>Advisor: Alexandre Refregier   |  |
| EDUCATION             | <b>Physics Department, Stanford University</b><br>Ph.D., Department of Physics<br>June 2013<br><ul style="list-style-type: none"><li>• Thesis Topic: <i>Systematic Effects in Weak Lensing Measurements for Future Optical Surveys</i></li><li>• Advisers: Prof. Steven M. Kahn &amp; Prof. Rafe H. Schindler</li></ul> <b>Physics Department, National Taiwan University</b><br>B.S., Department of Physics<br>June 2007   |  |
| AWARDS                | <b>Editor's choice in Physical Review Letters</b> 2015<br>Our paper <i>Wide-Field Lensing Mass Maps from DES Science Verification Data</i> 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.<br><br><b>62nd Meeting of Nobel Laureate</b> , Lindau, Germany 2012<br>Nominated by the USA to attend.  |  |
| COLLABORATIONS        | <b>The South Pole Telescope (SPT)</b> 2016 – present<br>Member of the DES-SPT cross-correlation analysis group.<br><br><b>The Dark Energy Survey (DES)</b> 2013 – present<br>Co-convener of the weak lensing mass mapping working group. Member of the science working groups: weak lensing, large-scale structure, simulation.<br><br><b>The Large Synoptics Survey Telescope (LSST)</b> 2010 – present<br>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        | (* denotes invited talk)<br><b>Astro/Cosmology Seminar*</b> , CMU, PA, USA October 13, 2017<br><b>Astrophysics and Cosmology Seminar*</b> , UIUC, IL, USA September 20, 2017<br><b>Cosmology Seminar*</b> , BNL, NY, USA September 14, 2017   |  |

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|                          | <b>Instrumentation Seminar*</b> , BNL, NY, USA                                | September 13, 2017       |
|                          | <b>The Nonlinear Universe</b> , Smartno, Slovenia                             | July 20, 2017            |
|                          | <b>Fermilab 50th User Meeting*</b> , Fermilab, IL, USA                        | June 8, 2017             |
|                          | <b>KICP Colloquium*</b> , KICP, IL, USA                                       | May 31, 2017             |
|                          | <b>Astronomy Chalk Talk*</b> , U of Chicago, IL, USA                          | January 24, 2017         |
|                          | <b>Cosmology Seminar*</b> , UCL, London, UK                                   | December 21, 2016        |
|                          | <b>Astronomy Colloquium*</b> , UIUC, IL, USA                                  | November 1, 2016         |
|                          | <b>KICP Friday Seminar*</b> , KICP, IL, USA                                   | October 7, 2016          |
|                          | <b>Cosmology Seminar</b> , KIPAC, CA, USA                                     | May 16, 2016             |
|                          | <b>Kosmologietag Overview Talk*</b> , Bielefeld University, Germany           | April 29, 2016           |
|                          | <b>Astronophysics Colloquium</b> , ASIAA, Taipei, Taiwan                      | March 28, 2016           |
|                          | <b>RAS Specialist Discussion Meeting*</b> , London, UK                        | February 12, 2016        |
|                          | <b>Swiss Python Summit</b> , Rapperswil, Switzerland                          | February 5, 2016         |
|                          | <b>Astrophysics Seminar</b> , Rutgers University, NJ, USA                     | August 11, 2015          |
|                          | <b>Cosmology Lunch</b> , Princeton University, NY, USA                        | August 10, 2015          |
|                          | <b>Fourteenth Marcel Grossmann Meeting (MG14)</b> , Rome, Italy               | July 17, 2015            |
|                          | <b>APS April meeting</b> , Baltimore, MD, USA                                 | April 14, 2015           |
|                          | <b>Weekly Colloquium</b> , IEEC-CSIC, Barcelona, Spain                        | October 8, 2014          |
|                          | <b>Astrophysics Seminar</b> , ASIAA, Taipei, Taiwan                           | September 19, 2014       |
|                          | <b>Research Seminar*</b> Shanghai Jiao Tong University, Shanghai, China       | September 9, 2014        |
|                          | <b>DES-LSST Joint Workshop</b> , Fermilab, IL, USA                            | March 24, 2014           |
|                          | <b>Swiss Cosmology Day</b> , ETH Zurich, Switzerland                          | February 6, 2014         |
|                          | <b>ETH Research Seminar</b> , ETH Zurich, Zurich, Switzerland                 | September 19, 2013       |
|                          | <b>Astrophysics Seminar</b> , JPL, CA, USA                                    | September 2012           |
|                          | <b>Special Seminar</b> , IPMU, Tokyo, Japan                                   | August 2012              |
|                          | <b>SnowPAC</b> , Snowbird, CO, USA  | March 22, 2012           |
| STUDENT<br>MENTORING     | <b>Dimitrios Tanoglidis</b> : PhD student at KICP, Summer 2017 – present      |                          |
|                          | <b>Rebecca Chen</b> : undergraduate student at KICP, Winter 2016 – present    |                          |
|                          | <b>Gourav Khullar</b> : PhD student at KICP, Winter 2016 – present            |                          |
|                          | <b>Giulia Chirivi</b> : undergraduate student at ETH Zurich, Fall 2015        |                          |
|                          | <b>Fabienne Dahinden</b> : undergraduate student at ETH Zurich, Spring 2015   |                          |
|                          | <b>Sebastian Gaebel</b> : master student at ETH Zurich, Spring 2014           |                          |
| TEACHING AND<br>OUTREACH | <b>KICP</b>   |                          |
|                          | <b>Volunteer at the Adler Planetarium: <i>Astronomy Conversations</i></b>     | 2016 – present           |
|                          | <b>ETH Zurich</b>   |                          |
|                          | <b>Astrophysics I: <i>Substitute Lecturer</i></b>                             | Fall 2015, Fall 2014     |
|                          | <b>Astrowoche: <i>Teaching Assistant</i></b>                                  | Spring 2016, Spring 2015 |
|                          | <b>Cosmological Probes: <i>Teaching Assistant and Substitute Lecturer</i></b> | Spring 2014              |
|                          | <b>Stanford University / SLAC National Accelerator Laboratory</b>             |                          |
|                          | <b>Physics 21, Mechanics and Heat: <i>Teaching Assistant</i></b>              | Fall 2011                |
|                          | <b>Physics 23, Electricity and Optics: <i>Teaching Assistant</i></b>          | Winter 2007              |
|                          | <b>Physics 41, Light and Heat: <i>Teaching Assistant</i></b>                  | Fall 2007                |
|                          | <b>SLAC tour guide</b>  | 2010 – 2013              |

## REFERENCES

**Prof. Joshua A. Frieman** ([frieman@fnal.gov](mailto: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](mailto: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](mailto:sdodelso@andrew.cmu.edu); +1-412-268-5432)

- Professor and Department Head of Physics, Carnegie Mellon University

**Prof. Bhuvnesh Jain** ([bjain@physics.upenn.edu](mailto:bjain@physics.upenn.edu); +1-215-573-5330)

- Professor of Physics and Astronomy Department, University of Pennsylvania

## Publication List

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### 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,  
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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

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