

# Ting Li

## Mailing Address

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## Research Interests

Near-field Cosmology, Dark Matter, Dwarf Galaxies, Stellar Streams, Stellar Kinematics;  
Galactic Archaeology, Metal-poor Stars, Stellar Populations, First Stars and Galaxies;  
Ground-based Instrumentation, Optical Spectrograph, Stellar Spectroscopy;  
Modern Sky Surveys, Survey Commissioning and Science Verification; Survey Science.

## Research Positions

Hubble Fellow, Carnegie-Princeton Fellow Carnegie Observatories, Carnegie Institution for Science Pasadena, California, USA Department of Astrophysical Sciences, Princeton University Princeton, New Jersey, USA	2019 –
Leon M. Lederman Fellow in Experimental Physics Fermi National Accelerator Laboratory Batavia, Illinois, USA	2016 – 2019
Research Associate Department of Physics & Astronomy, Texas A&M University College Station, Texas, USA	2011 – 2016
Research Associate Department of Earth & Planetary Science, Tokyo University Tokyo, Japan	2010
Summer Research Intern Swedish Institute of Space Physics Kiruna, Sweden	Summer 2009

## Education

<b>Ph.D., Physics</b> , Texas A&M University, Texas, USA Thesis: <i>Exploring Milky Way Halo Substructures with Large-area Sky Surveys</i> Advisors: Dr. Darren L. DePoy, Dr. Jennifer L. Marshall (Co-chair)	Aug 2016
<b>M.S., Space Science and Technology</b> (SpaceMaster – Erasmus Mundus Course) Luleå University of Technology, Kiruna, Sweden Université Paul Sabatier Toulouse III, Toulouse, France Thesis: <i>Design of the High Energy Particle Instrument for Electrons for the Energization and Radiation in Geospace Mission</i> Advisor: Masafumi Hirahana, University of Tokyo / JAXA	Aug 2010
<b>B.S., Physics</b> , Fudan University, Shanghai, China Thesis: <i>Study of Quasar Accretion Disk with Microlensing</i> Advisor: Feng Yuan, Shanghai Astronomical Observatory	Jun 2008
<b>Minor, Diplomacy</b> , Fudan University, Shanghai, China	Jun 2008

## Honors & Awards

NASA Hubble Fellowship	2019 – 2022
Joint Carnegie-Princeton Fellowship	2019 – 2024
KICP Associate Fellow, University of Chicago	2016 – 2019
Leon M. Lederman Fellow in Experiment Physics	2016 – 2019
Mitchell Institute Graduate Fellowship	2015 – 2016
Dr. Chia-Lai Wang Memorial Scholarship	2013 – 2014
Erasmus Mundus Scholarship	2008 – 2010
Graduated with First - Class Student, Fudan University	2008
People's Scholarship, Fudan University	2004 – 2008

## Scientific Collaborations

PI, Southern Stellar Stream Spectroscopic Survey (S5) <a href="https://s5collab.github.io/">https://s5collab.github.io/</a>	2018 –
Member, DECam Local Volume Exploration (DELVE) <a href="https://delve-survey.github.io/">https://delve-survey.github.io/</a>	2018 –
Member, LSST Dark Energy Science Collaboration (DESC)	2016 –
Member, Dark Energy Spectroscopic Instrument (DESI)	2016 –
Member, Magellanic Satellites Survey (MagLiteS)	2016 –
Builder, Dark Energy Survey (DES)	2015 –
Member, Dark Energy Survey (DES)	2012 –

## Service and Leadership

Referee for ApJ, MNRAS, Astronomy & Astrophysics	2015 –
S5 Project Leader/Founder (~ 40 members)	2018 –
DES Milky Way Working Group Coordinator (~ 50 members)	2018 –
Group Leader, Dark Matter Group for Maunakea Spectroscopic Explorer	2018 –
SOC member, Kavli/AURA Workshop "Petabytes to Science"	2018 – 2019
SOC chair, KICP Workshop "Near-Field Cosmology with DES's DR1"	2018
Co-organizer, Astro Seminar, Fermilab	2018 – 2019
Group Leader, DES Chromatic Correction and Interstellar Reddening Task Force	2017 –
DES Early Career Scientist Committee	2016 – 2018
Community Study Author, "Maximizing Science in the Era of LSST"	2016

## Student Mentoring

Nora Shipp (5th year graduate student at Univ. of Chicago) • Publication 26 & 39 in "Selected Refereed Publication" list	2017 –
Sydney Jenkins (3rd year undergrad/Chancellor Fellow at Univ. of Chicago) • Paper on dwarf galaxy spectroscopy in preparation.	2018 –
Ethan Tse (High school student at IMSA) • Data quality assurance for S5	2018 – 2019
Daniel Nagasawa (Former graduate student at Texas A&M) • Publication 23 in "Selected Refereed Publication" list	2015 – 2018
Nicholas Mondrik (Former undergrad at Texas A&M; graduate at Harvard) • Publication 9 in "Selected Refereed Publication" list	2015 – 2016

## Teaching and Outreach

Lecturer, Fermilab Lifelong Learning Institute (LLI) Program	2018 – 2019
Lecturer, Fermilab Saturday Morning Physics for High School Students	2017 – 2019
Coordinator, Fermilab Saturday Morning Physics for High School Students	2016 – 2019
E/PO representative, Dark Energy Survey	2014 – 2016
Coordinator, Science Olympiad	May 2014
Instructor, "Expanding Your Horizons" Workshop	Nov 2012
Organizer, Texas A&M Physics and Astronomy Festival	April 2011 – 2014
Organizer, Texas A&M Star Parties	2011 – 2013
Lab instructor, Astronomy 111: Overview of Modern Astronomy	Fall 2011
Teaching Assistant, Astronomy 314: Survey of Astronomy	Fall 2010

## Observation, Data Reduction & Instrumentation Experience

### Contribution to DES:

- Commissioning and Operation, Photometric Calibration, Data Release
- Designed and built the Atmospheric Transmission Monitoring Camera (aTmCam), including 100+ nights of prototype testing and instrument commissioning
- Earned **DES builder status (authorship)** and **personal data rights** since 2015

### Contribution to DESI:

- Active Optics System on Focus and Alignment for DESI
- Science Verification Coordinator for Milky Way Survey

### Extensive observing experience:

- Optical imaging: CTIO, Blanco(4m)/DECam (DES/DECaLS, 80+ nights); KPNO, Mayall(4m)/Mosaic3 (MzLS, 4 nights)
- Optical spectroscopy: LCO, Magellan(6.5m)/IMACS (30+ nights), Magellan(6.5m)/MIKE (11 nights), Magellan(6.5m)/M2FS (8 nights); McDonald Observatory, 2.1m/ES2 (30+ nights), 2.7m/VIRUS-P (9 nights).
- **Served as PI or co-PI for over 80 nights on 4m–8m class telescopes**

### Experience with spectroscopic analysis and reduction:

- High resolution spectroscopy: HET(9.4m)/HRS, VLT(8.2m)/UVES, Magellan(6.5m)/MIKE
- Multi-object spectroscopy: Magellan(6.5m)/IMACS, VLT(8.2m)/GIRAFFE, AAT(4m)/AAOmega

Assembled over 80 Instrument Collimators of the Visible Integral-Field Replicable Unit Spectrographs for the Hobby-Eberly Telescope Dark Energy Experiment (HETDEX)

Designed a web-based Exposure Time Calculator for GMACS (an optical multi-object spectrograph) for the Giant Magellan Telescope:

- <http://instrumentation.tamu.edu/cgi-bin/gmacs.cgi>

## Selected Recent Conferences, Seminars, Colloquia

19. Colloquium, UC Santa Cruz, Santa Cruz, CA, Nov 2019
18. Colloquium, University of Toronto, Toronto, Canada, Oct 2019
17. Invited Talk, IAU Symposium 353 "Galactic Dynamics in the Era of Large Surveys", Shanghai, China, Jul 2019
16. Invited Talk, Conference "Science in our own Backyard: Exploring the Galaxy and the Local Group with WFIRST", Caltech, Pasadena, CA, Jun 2019

15. Invited Talk, KITP Workshop "In the Balance: Stasis and Disequilibrium in the Milky Way", Santa Barbara, CA, Apr 2019
14. Contributed Talk, Conference "Massively multiplexed spectroscopy with MSE: Science, Project and Vision", Tucson, AZ, Feb 2019
13. Invited Participant, Kavli/AURA Salon Workshop "Terabytes to Science", Chicago, IL, Jul 2018
12. Organizer, KICP Workshop, Near-Field Cosmology with DES's DR1 and Beyond, Chicago, IL, Jun 2018
11. Invited Long-term Participant, KITP Workshop, The Small-Scale Structure of Cold(?) Dark Matter, Santa Babara, CA, May 2018
10. Invited Plenary Talk, SnowPAC, Big Questions, Big Surveys, Big Data: Astronomy & Cosmology in the 2020s, Snowbird, UT, May 2018
9. Colloquium, Australia Astronomical Observatory, Sydney, Australia, Nov 2017
8. Contributed Talk, Conference "Shedding Light on the Dark Universe with Extremely Large Telescopes", Lanzhou, China, Aug 2017
7. Invited Talk, Future Cosmic Surveys Workshop, Chicago, IL, Sep 2016
6. Invited Participant, Maximizing Science in the Era of LSST: A Community-based Study of Needed US OIR Capabilities, Tuscon, May 2016
5. Invited Talk, 227th Meeting of the American Astronomical Society, Kissimmee, FL, Jan 2016
4. Invited Talk, 2015 Meeting of the APS Division of Particles and Fields (DPF 2015), Ann Arbor, MI, Aug 2015
3. Contributed Talk, GMT Community Science Meeting: reSolving Galaxies in the Era of Extremely Large Telescopes, Pacific Grove, CA, Oct 2015
2. Contributed Talk, Thirty Meter Telescope Science Forum, Washington D.C., May 2015
1. Contributed Talk, DECam Community Science Workshop, Tuscon, AZ, March 2015

## References

### Joshua D. Simon

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### Joshua A. Frieman

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### Darren L. DePoy

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### Jennifer L. Marshall

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### Nicholas B. Suntzeff

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### Brian Yanny

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## Selected Refereed Publications

**Summary: 140+ refereed publications, including 8 1st author, 9 2nd/3rd author, 40 with significant contributions. *h*-index: 41**

For complete publication list, please refer to:

<https://ui.adsabs.harvard.edu/public-libraries/UGFGnC9bTu-vBkgMrq0bgg>

40. Li, T. S., Koposov, S. E., Zucker, D. B., "The Southern Stellar Stream Spectroscopic Survey (*S*<sup>5</sup>): Overview, Target Selection, Data Reduction, Validation, and Early Science", MNRAS, in press, arXiv:1907.09481
39. Shipp, N., Li, T. S., Pace, A. B., et al. "Proper Motions of Stellar Streams Discovered in the Dark Energy Survey", ApJ, in press, arXiv:1907.09488
38. Koposov, S. E., Boubert, D., Li, T. S., et al. "The Great Escape: Discovery of a nearby 1700 km/s star ejected from the Milky Way by Sgr A\*", MNRAS, in press, arXiv:1907.11725
37. Torrealba, G., Belokurov, V., Koposov, S. E., Li, T. S., et al. "The hidden giant: discovery of an enormous Galactic dwarf satellite in Gaia DR2", 2019, MNRAS, 488, 2743
36. Erkal, D., Belokurov, V., Laporte, C. F. P., Koposov, S. E., Li, T. S., et al. "The total mass of the Large Magellanic Cloud from its perturbation on the Orphan stream", 2019, MNRAS, 487, 2685
35. Koposov, S. E., Belokurov, V., Li, T. S., et al. "Piercing the Milky Way: an all-sky view of the Orphan Stream", 2019, MNRAS, 485, 4726
34. Wang, M. Y., de Boer, T., Pieres, A., Li, T. S., et al. "The Morphology and Structure of Stellar Populations in the Fornax Dwarf Spheroidal Galaxy from Dark Energy Survey Data", 2019, ApJ, 881, 118
33. Pace, A. B. & Li, T. S., "Proper motions of Milky Way Ultra-Faint satellites with *Gaia* DR2 × DES DR1", 2019, ApJ, 875, 77
32. Dey, Arjun et al. (including Li, T. S.), "Overview of the DESI Legacy Imaging Surveys", 2019, AJ, 157, 168
31. Wang, M. Y., Koposov, S., Drlica-Wagner, A., Pieres, A., Li, T. S., "Rediscovery of the Sixth Star Cluster in the Fornax Dwarf Spheroidal Galaxy", 2019, ApJ, 875, 13
30. Abbott, B. P., et al. (including Li, T. S.), "The Dark Energy Survey: Data Release 1", 2018, ApJS, 239, 18
29. Erkal, D., Li, T. S., Koposov, S. E., Belokurov, V., et al., "Modelling the Tucana III stream - a close passage with the LMC", 2018, MNRAS, 481, 3148.
28. Li, T. S., Simon, J. D., Kuehn, K., et al., "The First Tidally Disrupted Ultra-Faint Dwarf Galaxy? - Spectroscopic Analysis of the Tucana III Stream", 2018, ApJ, 866, 22.
27. Li, T. S., Simon, J. D., Pace, A. B., et al. "Ships Passing in the Night: Spectroscopic Analysis of Two Ultra-faint Satellites in the Constellation Carina", 2018, ApJ, 857, 145.
26. Shipp, N., Drlica-Wagner, A., Balbinot, E., Ferguson, P., Erkal, D., Li, T. S., et al., "Stellar Streams Discovered in the Dark Energy Survey", 2018, ApJ, 862, 114.
25. Bernstein, G. M., Abbott, T. M. C., Armstrong, R., Burke, D. L., Diehl, H. T., Gruendl, R. A., Johnson, M. D., Li, T. S., et al., "Photometric Characterization of the Dark Energy Camera", 2018, PASP, 130, 4501.

24. Bergemann, M., Sesar, B., Cohen, J., Serenelli, A. M., Sheffield, A. A., Li, T. S. et al., "Witnessing Galactic eviction – disc stars at extreme locations around our Galaxy", 2018, *Nature*, 555, 334.
23. Nagasawa, D. Q., Marshall, J. L., Li, T. S. et al. "Chemical Abundance Analysis of Three  $\alpha$ -Poor, Metal-Poor Stars in the Ultra-Faint Dwarf Galaxy Horologium I", 2018, *ApJ*, 852, 99.
22. Torrealba, G. et al. (including Li, T. S.), "Discovery of two neighbouring satellites in the Carina constellation with MagLiteS", 2018, *MNRAS*, 475, 5085
21. Drlica-Wagner, A., et al. (including Li, T. S.), "Dark Energy Survey Year 1 Results: Photometric Data Set for Cosmology", 2018, *ApJS*, 235, 33.
20. Abbott, B. P., et al. (including Li, T. S.), "A gravitational-wave standard siren measurement of the Hubble constant", 2017, *Nature*, 551, 85.
19. Abbott, B. P., et al. (including Li, T. S.), "Multi-messenger Observations of a Binary Neutron Star Merger", 2017, *ApJ*, 848, L12.
18. Cowperthwaite, P. S., et al. (including Li, T. S.), "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. II. UV, Optical, and Near-infrared Light Curves and Comparison to Kilonova Models", 2017, *ApJ*, 848, L17.
17. Soares-Santos, M., et al. (including Li, T. S.), "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. I. Discovery of the Optical Counterpart Using the Dark Energy Camera", 2017, *ApJ*, 848, L16.
16. Johnston, K. V., Price-Whelan, A. M., Bergemann, M., Laporte, C., Li, T. S. et al., "Disk Heating, Galactoseismology, and the Formation of Stellar Halos", 2017, *Galax*, 5, 44.
15. Li, T. S., Sheffield, A. A., Johnston, K. V., Marshall, J. L., Majewski, S. R. et al., "Exploring Halo Substructure with Giant Stars", 2017, *ApJ*, 844, 74.
14. Burke, D., Rykoff, E., et al. (including Li, T. S.), Forward Global Photometric Calibration of the Dark Energy Survey, 2018, *AJ*, 155, 41.
13. Li, T. S., Simon, J. D., Drlica-Wagner, A., Bechtol, K., et al. "Farthest Neighbor: The Distant Milky Way Satellite Eridanus II", 2017, *ApJ*, 838, 8
12. Simon, J. D., Li, T. S., Drlica-Wagner, A., Bechtol, K., et al. "Nearest Neighbor: The Low-mass Milky Way Satellite Tucana III", 2017, *ApJ*, 838, 44
11. Hansen, T. T., Simon, J. D., Marshall, J. L., Li, T. S., et al. "An r-process Enhanced Star in the Dwarf Galaxy Tucana III", 2017, *ApJ*, 838, 11
10. Li, T. S., DePoy, D. L., Marshall, J. L., Tucker, D. L., Bernstein, G. M., et al. "Assessment of Systematic Chromatic Errors that Impact Sub-1% Photometric Precision in Large-Area Sky Surveys", 2016, *AJ*, 151, 157
9. Li, T. S., Balbinot, E., Mondrik, N., et al. "Discovery of a Stellar Overdensity in Eridanus-Phoenix in the Dark Energy Survey", 2016, *ApJ*, 817, 135
8. Balbinot, E., Yanny, B., Li, T. S., et al. "The Phoenix stream: a cold stream in the Southern hemisphere", 2016, *ApJ*, 820, 58.
7. Melendez, J., Placco, V. M., Tucci-Maia, M., Ramirez, I., Li, T. S., "2MASS J18082002-5104378: The Brightest ( $V=11.9$ ) Ultra Metal-Poor Star", 2016, *A&A*, 585, 5

6. Simon, J. D., Drlica-Wagner, A., **Li, T. S.**, et al. "Stellar Kinematics and Metallicities in the Ultra-faint Dwarf Galaxy Reticulum II", 2015, *ApJ*, 808, 95
5. Drlica-Wagner, A., et al. (including **Li, T. S.**), "Eight Ultra-faint Galaxy Candidates Discovered in Year Two of the Dark Energy Survey", 2015, *ApJ*, 813, 109.
4. Drlica-Wagner, A., et al. (including **Li, T. S.**), "Search for Gamma-Ray Emission from DES Dwarf Spheroidal Galaxy Candidates with Fermi-LAT Data", 2015, *ApJ*, 809, L4
3. Bechtol, K., et al. (including **Li, T. S.**), "Eight New Milky Way Companions Discovered in First-year Dark Energy Survey Data", 2015, *ApJ*, 807, 50
2. Flaugher, B., et al. (including **Li, T. S.**), "The Dark Energy Camera", 2015, *AJ*, 150, 150
1. **Li, T. S.**, Marshall, J. L., Lépine, S., Williams, P., Chavez, J., "Optical BVRI Photometry of Common Proper Motion F/G/K+M Wide Separation Binaries", 2014, *AJ*, 148, 60

## Selected Conference Proceedings

4. **Li, T. S.**, DePoy, D. L., Marshall, J. L., Nagasawa, D. Q., Carona, D. W., Boada, S., "Monitoring the atmospheric throughput at Cerro Tololo Inter-American Observatory with aTmCam", 2014, *Proc. of SPIE Vol. 9147, 91476Z*, arXiv:14077047
3. DePoy, D. L., Allen, R., **Li, T. S.**, Marshall, J. L., Papovich, C., Prochaska, T., Shectman, S., "An update on the wide field, multi-object, moderate-resolution, spectrograph for the Giant Magellan Telescope", 2014, *Proc. of SPIE Vol. 9147, 914720*
2. Marshall, J. L., DePoy, D. L., Prochaska, T., Allen, R.D., Williams, P., Rheault, J.-P., **Li, T. S.**, and 22 colleagues, "VIRUS instrument collimator assembly", 2014, *Proc. of SPIE Vol. 9147, 91473S*
1. **Li, T. S.**, DePoy, D. L., Kessler, R., Burke, D. L., Marshall, J. L., Wise, J., Rheault, J.-P., Carona, D. W., Boada, S., Prochaska, T., Allen, R., "aTmcam: a simple atmospheric transmission monitoring camera for sub 1% photometric precision", 2012, *Proc. of SPIE Vol. 8446, 84462L*, arXiv:14077047

## Selected White Papers, Reports, Books

5. Chapter Leader, The Detailed Science Case for the Maunakea Spectroscopic Explorer, 2019 edition, 2019, arXiv:1904.04907 (entire document), arXiv: 1903.03155 (one chapter)
4. Organizer and Chapter Author, Petabytes to Science, 2019, arXiv:1905.05116
3. Author for 7 Astro2020 Science White Papers (including one leading author).
2. Chapter Author, GMT Science Book 2018: [https://www.gmto.org/gallery/gmt-resources/#GMT\\_Science\\_Book\\_2018](https://www.gmto.org/gallery/gmt-resources/#GMT_Science_Book_2018)
1. Chapter Author, Maximizing Science in the Era of LSST: A Community-Based Study of Needed US Capabilities, 2016, arXiv:1610.01661