

Curriculum Vitae — Liang Dai

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Research Interests

Gravitational lensing: galaxy and cluster lensing; micro-lensing; lensing of transients;

Gravitational waves: parameter estimation & data analysis; compact binary coalescence; stochastic background;

Cosmology: large-scale structure; cosmic microwave background;
inflationary physics; redshifted 21cm cosmology;

Mathematical methods: total-angular-momentum formalism;

Employment

2018.09 – present **Bahcall Postdoctoral Fellow**, Institute for Advanced Study, Princeton, NJ

2015.09 – 2018.08 **NASA Einstein Fellow**, Institute for Advanced Study, Princeton, NJ.

Education

2011.09 – 2015.07 **Ph.D. in Physics**, Johns Hopkins University, USA.

Advisor: Prof. Marc Kamionkowski

Thesis: *Primordial Perturbation in the Universe: Theory, Detection and Implication For Inflation*

2007.09 – 2011.06 **B.S. in Physics**, Peking University, China.

Advisor: Prof. Chong Sheng Li

Thesis: *Exploring New Physics at the LHC*

Teaching Experience

2019.09 Lecture Series on Gravitational Wave Data Analysis, TianQin Center at SYSU, China.

2014.02 – 2014.05 171.606 Quantum Mechanics II, Teaching Assistant, Johns Hopkins University.

2012.09 – 2012.12 173.111 General Physics I: Lab Instructor, Johns Hopkins University.

2012.09 – 2012.12 173.111 General Physics I: Conference Session Instructor, Johns Hopkins University.

Talks & Presentations

Probing Axion Dark Matter Minihalos Using Extremely Magnified Stars: A New Hope?

2019.07 Talk given at the conference *Astrophysical Dynamics*, T. D. Lee Institute, China.

Discovering Binary Black Holes in LIGO-Virgo Open Data

2019.09 (*invited*) Physics & Astronomy Seminar, SYSU, China.

2019.06 (*invited*) *Merging Visions: Exploring Compact-Object Binaries with Gravity and Light*, KITP, USA.

New Developments in Analyzing Gravitational Wave Data For Compact Binary Mergers

2019.05 (*invited*) Strong Gravity Seminar, Perimeter Institute, Canada.

2019.05 (*invited*) Physics Seminar, Harvard University, USA.

2019.04 (*invited*) Astro/Cosmology Seminar, University of California Berkeley, USA.

Einstein's Microscope: Learn About the Dark Matter From Caustic Transiting Stars

2019.02 (*Invited*) Astrophysics Seminar, Weizmann Institute of Science, Israel.

2019.02 (*Invited*) Astrophysics Colloquium, University of Washington, USA.

2019.01 (*Invited*) Colloquium Talk at Mini-Workshop in Astrophysics, T. D. Lee Institute, Shanghai, China.

Lensing and Diffraction of Gravitational Waves

2018.12 (*Invited*) JSI Gravitational Wave Physics and Astronomy Workshop, University of Maryland, USA.

Lensing of Gravitational Waves

2018.10 (*Invited*) Astrophysics Lunch Seminar, Cornell, USA.

Detecting Diffractive Lensing in Astrophysical Gravitational Waves

2018.10 IAS/Princeton Postdoc Symposium 2018, IAS, USA.

2018.10 NASA Einstein Symposium, Harvard CfA, USA.

Fast parameter estimation of compact binary gravitational-wave sources

2018.06 (*Invited*) Seminar talk given to the KAGRA Collaboration, ICRR University of Tokyo, Japan.

Probing Cold Dark Matter Substructure With Caustic Crossing Stars In Lensing Galaxy Clusters

2018.08 (*Invited*) Presentation at Workshop on WFIRST/LSST Deep Fields, Princeton University, USA.

2018.07 (*Invited*) Astrophysics Seminar, KIAA, China.

2018.07 (*Invited*) Astrophysics Colloquium, Tsinghua University, China.

2018.06 (*Invited*) Astronomy–Particle–Physics–Experimental Physics–Cosmology Seminar, Kavli IPMU, Japan.

2018.04 Conference *Shedding Light on the Dark Universe with Extremely Large Telescopes*, UCLA, USA.

New Applications of Gravitational Lensing

2018.02 (*Invited*) Astrophysics & HEP Seminar, Penn State University, USA.

2017.12 Princeton Astrophysical Symposium, Princeton University, USA.

2017.11 (*Invited*) Astrophysics Seminar, Fermilab, USA.

Probing Cluster Halos With Caustic Crossing Stars

2017.10 NASA Einstein Symposium, Harvard University CfA, USA.

Caustic-Crossing at Giga-parsecs Away and Microlensing

2016.10 NASA Einstein Symposium, Harvard CfA, USA.

Lensing magnification bias on the apparent distribution of black hole mergers

2016.08 COSMO-16 conference, Ann Arbor, USA.

Gravitational Lensing of the Transient Sky

2016.04 (*Invited*) TAPIR Seminar, Caltech, USA.

2016.02 (*Invited*) Gravity Group seminar, Princeton University, USA.

Understanding Non-Gaussianity Signatures in General Relativity

2016.04 (*Invited*) DAP Thesis Prize Talk at APS April Meeting, Salt Lake City, USA.

Relativistic clustering and separate universe formalism

2015.10 NASA Einstein Fellowship Symposium, Harvard University CfA, USA.

2015.04 (*Invited*) Astrophysical Wine & Cheese talk, Johns Hopkins University, USA.

2015.03 Neighborhood Workshop on Astrophysics and Cosmology, Pennsylvania State University, USA.

Conformal Fermi coordinates and separate universe formalism

- 2015.01 *(Invited)* Cosmology seminar, Max-Planck-Institut für Astrophysik, Germany.
- 2014.12 *(Invited)* Cosmology Lunch, Princeton University, USA.
- 2014.11 *(Invited)* KICP Friday Seminar, University of Chicago, USA.
- 2014.10 *(Invited)* Cosmology seminar talk, University of California, Berkeley, USA.
- 2014.10 *(Invited)* High energy physics seminar talk, University of Pennsylvania, USA.

Inflation, reheating, and gravity waves

- 2014.07 Seminar talk, NAOC, China.
- 2014.07 Seminar talk, IHEPCAS, China.
- 2014.05 *(Invited)* Cosmology Seminar at IAS/Princeton, Princeton University, USA.

Reheating constraints on inflation

- 2014.04 *(Invited)* Wine & Cheese seminar talk, Johns Hopkins University, USA.
- 2014.04 The Case Western-Columbia-JHU-NYU-UPenn Joint Cosmology and Particle Physics meeting, Columbia University, USA.

Rees-Sciama effect from collapsed dark matter halos

- 2014.04 Neighborhood Workshop on Astrophysics and Cosmology, Pennsylvania State University, USA.
- 2014.04 Session talk at the American Physical Society April Meeting, Savannah, USA.

New Relics of Inflation

- 2013.10 *(Invited)* Price Prize Talk, CCAPP, Ohio State University, USA.

Digging for inflation fossils from the cosmic microwave background

- 2013.05 Phenomenology 2013 Symposium, University of Pittsburgh, USA.
- 2013.04 *Cosmology Beyond The Power Spectrum*, University of California, Berkeley, USA.
- 2013.04 Neighborhood Workshop on Astrophysics and Cosmology, Pennsylvania State University, USA.

One-loop helicity amplitudes for top-quark pair production in Randall-Sundrum Model

- 2012.05 Phenomenology 2012 Symposium, University of Pittsburgh, USA.

Dark matter: evidences and detection

- 2012.03 Physics Seminar Talk, Johns Hopkins University, USA.

Conferences, Workshops, & Intersession Schools

- 2019.07 *Astrophysics Dynamics*, TDLI, China.
- 2019.06 *Merging Visions: Exploring Compact-Object Binaries with Gravity and Light*, KITP, CA.
- 2018.12 JSI Gravitational Wave Physics and Astronomy Workshop, University of Maryland, MD.
- 2018.09 Princeton-2018 CMB-S4 Collaboration Workshop, Princeton University, NJ.
- 2018.08 WFIRST/LSST Deep Fields, Princeton University, NJ.
- 2018.04 Conference *Shedding Light on the Dark Universe with Extremely Large Telescopes*, UCLA, CA.
- 2017.10 IAU Symposium 338 on Gravitational Wave Astrophysics, Baton Rouge, LA.
- 2017.08 CMB Stage-4 Workshop, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA.
- 2017.02 *Fast Radio Bursts: New Probes of Fundamental Physics & Cosmology*, Aspen Center for Physics, CO.
- 2017.02 *The Dawning Era of Gravitational-Wave Astrophysics*, Aspen Center for Physics, CO.
- 2017.01 *The Transient Universe with JWST*, Harvard CfA, Cambridge, MA.
- 2016.08 COSMO-16 conference, University of Michigan, Ann Arbor, MI.
- 2016.04 2016 APS April Meeting, Salt Lake City, UT.
- 2015.09 *Unbiased Cosmology From Biased Tracers* Workshop, Institute for Advanced Study, Princeton, NJ.
- 2014.05 *Primordial Gravitational Waves and Cosmology* Workshop, Caltech, Pasadena, CA.
- 2014.05 *Phenomenology 2014* Symposium, University of Pittsburgh, Pittsburgh, PA.
- 2014.04 2014 APS April Meeting, Savannah, SC.
- 2014.04 Neighborhood Workshop on Astrophysics and Cosmology, Penn State University, State College, PA.
- 2014.01 Mini-Workshop on Non-Gaussianity, Princeton University, Princeton, NJ.
- 2013.06 BCVSPIN Summer School in Particle Physics and Cosmology, Zhejiang University, Hangzhou, China.
- 2013.06 2013 Shanghai Particle Physics and Cosmology Symposium, Shanghai, China.
- 2013.05 *Phenomenology 2013* Symposium, University of Pittsburgh, Pittsburgh, PA.
- 2013.04 *Cosmology Beyond The Power Spectrum* Workshop, University of California, Berkeley, CA.
- 2013.04 Neighborhood Workshop on Astrophysics and Cosmology, Penn State University, State College, PA.
- 2013.03 Case-Columbia-JHU-NYU-Penn Meeting in Cosmology and Particle Physics, University of Pennsylvania, Philadelphia, PA.
- 2012.08 XXVIII General Assembly of the International Astronomical Union, Beijing, China.
- 2012.06 Theoretical Advanced Study Institute in elementary Particle Physics (TASI), University of Colorado, Boulder, CO.
- 2012.05 *Phenomenology 2012* Symposium, University of Pittsburgh, Pittsburgh, PA.

Honors, Awards, & Fellowships

- 2018 Bahcall Fellowship, Institute for Advanced Study.
- 2015 American Physical Society (APS) DAP Thesis Prize.
- 2015 NASA Einstein Postdoctoral Fellowship.
- 2013 Chinese Government Award for Outstanding Self-financed Students Abroad.
- 2013 Dr. Pliny A. and Margaret H. Price Prize, the Ohio State University's Center for Cosmology and AstroParticle Physics.
- 2012 William Gardner Fellowship, Johns Hopkins University.
- 2011 Rowland Research Fellowship, Johns Hopkins University.

Journal Referee

Nature Communications; Nature Astronomy; Physical Review Letters; Physical Review D; Physics Reports; Journal of Cosmology and Astroparticle Physics; Monthly Notices of the Royal Astronomical Society; Astronomy & Astrophysics; Physica D: Nonlinear Phenomenon;

Academic Services

- 2018.09 – 2018.12 Organizer of IAS Informal Seminar Series, IAS.
- 2017.02 – 2017.05 Organizer of Princeton/IAS Joint Astrophysics Colloquium Series, IAS.
- 2016.09 – 2016.12 Organizer of IAS/Princeton Joint Astrophysics Colloquium Series, IAS.

Public Outreach

- 2014.04 Challengers physics contest for K12,
2014 Annual Physics Fair of the Department of Physics and Astronomy, Johns Hopkins University.
- 2013.04 Non-Newtonian fluid demonstration,
2013 Annual Physics Fair of the Department of Physics and Astronomy, Johns Hopkins University.
- 2012.04 Liquid icecream demonstration,
2012 Annual Physics Fair of the Department of Physics and Astronomy, Johns Hopkins University.

Computer Skills

OS: Windows, Linux.

Programming: PYTHON, C/C++, FORTRAN, Mathematica, html, FORM.

Last updated: October 6, 2019