Theo Schutt

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Research Statement

I am an observational cosmologist with a uniquely broad record as instrument builder, data analyst and theorist. I have helped commission Rubin Observatory's LSST Camera, led the characterization of the point-spread function on which all Dark Energy Survey weak lensing analyses rely, and proposed and implemented a completely new estimator for currently undetected CMB secondary anisotropies for the Atacama Cosmology Telescope. My goal is to understand the nature of dark energy and dark matter by developing new analysis methods for multiwavelength observables.

Education

June 2026 (expected) **Stanford University**
Ph.D., Physics

2020 **Columbia University**
B.A., Physics with minor in Mathematics, *magna cum laude*

2013 **Defense Language Institute Foreign Language Center**
A.A., Pashto-Afghan Studies

Honors & Awards

2022-present National Science Foundation Graduate Research Fellow

2022-2024 LSST Discovery Alliance Data Science Fellow

2020-2022 Stanford Department of Physics Fellow

2020-2022 Stanford Enhancing Diversity in Graduate Education Fellow

2018-2019 Barrie & Emmanuel Roman Scholar

2018 Columbia University School of General Studies Honor Society

Collaboration/Group Membership

2022-present CMB×LSS Group @ SLAC/Stanford

2021-present Dark Energy Survey (DES) Collaboration - *Builder*

2020-present Vera C. Rubin Observatory, Legacy Survey of Space and Time
Dark Energy Science Collaboration (LSST DESC) - *Full Member*

2019-2020 General Antiparticle Spectrometer (GAPS) Collaboration

2018-2020 Nuclear Spectroscopic Telescope Array (NuSTAR) @ Columbia

Lead/Co-lead Publications

T. Schutt, M. Jarvis, A. Roodman *et al.* [60 authors]. "Dark Energy Survey Year 6 Results: Point-spread Function Modeling". *The Open Journal of Astrophysics* 8 (2025). [Link]

W. R. Coulton, **T. Schutt**, A. S. Maniyar *et al.* [40 authors]. "The Atacama Cosmology Telescope: A search for late-time anisotropic screening of the cosmic microwave background". arXiv:2401.13033 (2024). [Link]

T. Schutt, A. S. Maniyar, E. Schaan *et al.* [5 authors]. "New 'Temperature Inversion' Estimator to Detect CMB Patchy Screening by Large-scale Structure". *Physical Review D* 109 10 103539 (2024). [Link]

K. Mori, C. J. Hailey, **T. Schutt** *et al.* [9 authors]. "The X-Ray Binary Population in the Galactic Center Revealed through Multi-decade Observations". *The Astrophysical Journal* 921 148 (2021). [Link]

Please see publication list at end for remaining publications and contribution statements.

Talks & Posters

** indicates an invited talk.*

Seminars & Lectures

2025
- * **Princeton/IAS Cosmology Seminar**: *Searching for Late-time Screening of the CMB*, 2025 Nov 6.
- * **Universidad de Chile Cosmology Seminar**: *Discovering the Dark Universe with the Dark Energy Survey and Vera C. Rubin Observatory*, 2025 Jun 26.
- * **Guest Lecture, Stanford Intro Observational Astrophysics**: B. Cantrall & **T. Schutt**, *Bridging the Cosmic Past and Present*, 2025 May 28.
- * **UChicago / KICP Survey Science Meeting**: *Detecting Late-time Screening of the CMB*, 2025 Apr 24.
- * **Fermilab Survey Science Meeting**: *Modeling the point-spread function for DES Year 6*, 2025 Apr 23.

2024
- **Guest Lecture, Stanford Intro & Graduate Observational Astrophysics**: *Discovering the Dark Universe with LSSTCam and the Vera C. Rubin Observatory*, 2024 Jun 3.
- * **Duke University Cosmology Seminar**: *Detecting Patchy Screening of the Cosmic Microwave Background*, 2024 Feb 22.

2023
- * **Princeton Survey Science Meeting**: **T. Schutt**, M. Yamamoto & N. Weaverdyck, *DES Y6: Systematic characterization and control of PSFs, cosmic shear and galaxy clustering*, 2023 Nov 13.

Conferences, Workshops & Webinars

2025
- * **AAS 245 Winter Meeting, DES+DESC Splinter Session**: *Point-spread function modeling for DES Year 6*, 2025 Jan 14.

2024
- **University of Cambridge, New Physics from Old Light Workshop: Illuminating the Universe with CMB Secondaries**: *Detecting Patchy Screening of the Cosmic Microwave Background*, 2024 Sep 19.

2023
- * **Cosmopalooza 2023**: *Building the World's Largest Weak Lensing Shape Catalogs*, 2023 Oct 5 (virtual). [recording]

2018
- **Columbia University AstroFest, Poster Session**: **T. Schutt**, K. Mori, C. J. Hailey, *Spatial distribution of black hole X-ray binaries in the central parsec of the Milky Way Galaxy*, 2018 Sep 7.

Collaboration & Department Talks

2025
- **Stanford University, KIPAC Tea Talk**: *My Three Months at Rubin!*, 2025 Aug 22.
- * **DESC Collaboration Meeting, Plenary Session**: *LSSTCam Finds its Home: The First Three Months of On-sky Commissioning*, 2025 Jul 22.

2024
- * **DES Collaboration Meeting, Plenary Session**: *Point-spread function modeling for Y6 galaxy shear estimation*, 2024 May 29.
- **Stanford University, KIPAC Tea Talk**: *Detecting Patchy Screening of the Cosmic Microwave Background*, 2024 Feb 9.

2023 * **DES Collaboration Meeting, Plenary Session**: M. Yamamoto & **T. Schutt**, *Overview of the Y6 Shear Catalogs*, 2023 Oct 11.

* **DESC ShearFest 2023**: *Color-dependent PSFs: Lessons from DES Y6*, 2023 Jul 20.

Rubin/LSST @ SLAC: *Color-dependent PSFs: Lessons from DES Y6*, 2023 Feb 24.

2022 **Rubin Project & Community Workshop, Graduate Student Poster Session**: *LSST Camera Characterization: Instrumentation, Image Analysis and Irregularities*, 2022 Aug 8.

* **DES Collaboration Meeting, Plenary Session**: M. Gatti, **T. Schutt**, M. Yamamoto, *DES Year 6 Shear Measurement Development*, 2022 May 24.

Stanford University, KIPAC Tea Talk: *PSF systematics in DES Y6 & LSST weak lensing analyses*, 2022 Feb 11.

2018 **Columbia Astronomy Department Weekly Talks**: *Spatial distribution of black hole X-ray binaries in the central parsec of the Milky Way Galaxy*, 2018 Sep 11.

Teaching & Mentoring

Teaching Experience

Spring 2025 **Guest Lecturer**: Introduction to Observational Astrophysics, Stanford University.

Spring 2024 **TA & Guest Lecturer**: Intro & Graduate Observational Astrophysics (combined courses), Stanford University.

Spring 2023 **TA**: Introduction to Observational Astrophysics, Stanford University.

Fall 2022 **TA**: Introductory Classical Mechanics Lab, Stanford University.

Pedagogical Training

Winter 2024 IDEAL Pedagogy Learning Community, Stanford's Center for Teaching and Learning.

Fall 2022 Teaching of Physics Seminar/Practicum, Stanford University.

Research Mentoring

Spring 2024 Zhuoqi (Jackie) Zhang, graduate student at Stanford, studied foreground bias to CMB screening as 10-week first-year rotation project.

Summer 2021 Hannah Kuder, undergraduate at Reed College, studied color dependence of the PSF in DES Y3 data as summer project at SLAC.

Professional Service

2024-present **Collaboration publication internal reviewer**: DES (1 paper), DESC (1 paper)

2021-25 **DES Shear Analysis Team Co-convener**: Co-organizer of ∼10-person analysis team. Responsibilities include facilitating weekly telecons, giving weekly team updates to the broader collaboration and organizing/chairing parallel sessions during yearly collaboration meetings.

2024 **Event volunteer**: Rubin Community Workshop at SLAC

2023 **Science organizing committee; session facilitator**: DES Y6KP Workshop at Princeton

Local organizing committee, co-lead of social activities subcommittee: DESC Collaboration Meeting at SLAC

AY 2018-19 **Columbia University Committee on Science Instruction**: School of General Studies student representative

2018 **Host institution proposal committee; event volunteer**: Conference for Undergraduate Women in Physics (CUWiP) at Barnard College, Columbia University and City College of New York

Broader Impacts

2025-present **KIPAC-Chile Engagement Program**
Co-founder of KIPAC Innovation Grant program ($15k seed funding) that provides KIPAC members working in Chile (e.g., for the Rubin and Simons observatories) funding and logistical support for short visits to Chilean institutions.

2023-present **KIPAC Public Stargazing**
Science communicator and 0.7m-class telescope operator for ∼quarterly public outreach stargazing events usually serving 50-150+ attendees.

2020-present **Stanford Physics, Identity and Equity Program**
Volunteer in yearly student-led 3-day workshop, plus extended one-on-one mentoring. Mentored four students through the graduate school application process, including progress check-ins and statement revisions. All four students had successful applications and matriculated at graduate physics programs.

2021, 2023 **Stanford Physics "Respect is Part of Research" Program**
Conversation facilitator in yearly graduate student orientation program where incoming students discuss in small groups how to encourage respectful research group dynamics and navigate potential identity-based conflicts or harmful situations.

AY 2022-23 **Letters to a Pre-Scientist**
Volunteer in year-long one-on-one snail mail pen pal program connecting STEM professionals with middle/high school students largely from underrepresented backgrounds.

AY 2018-19 **Barnard-Columbia Math Mentors**
Volunteer one-on-one math tutor for 6th graders at local public middle school.

2016-2020 **Columbia Spectra: A Society for Diversity and Inclusion in Physics**
Mentor to three underclassmen in physics and related majors.

Science Communication & Outreach

2025 Author: KIPAC Research Highlights blog post
Interview: *Symmetry Magazine* article

2024 SLAC/Rubin Observatory outreach video: Instagram / YouTube
Interview: Tri-Valley Stargazers
Poster judge: Stanford Research Conference (national undergraduate conference)
Event volunteer: Stanford STEM Day
Event volunteer: CUWiP at Stanford & SLAC

2023 Interview: Rubin Observatory press release / *Space.com* article
Interview: *VOA News* video feature
Event volunteer: KIPAC Community Day

2022 Interview: *Symmetry Magazine* article
Interview: *InMenlo* news article

Non-academic Experience

2012-2016 **US Air Force**, Pashto Cryptologic Language Analyst

Publication List

Lead/Co-lead Publications

14. **T. Schutt**, M. Jarvis, A. Roodman *et al.* [60 authors]. "Dark Energy Survey Year 6 Results: Point-spread Function Modeling". *OJAp* 8 (2025). [Link]

    Contribution: Performed almost all analysis and manuscript writing; contributed to PIFF *software package.*

13. W. R. Coulton, **T. Schutt**, A. S. Maniyar *et al.* [40 authors]. "The Atacama Cosmology Telescope: A Search for Late-Time Anisotropic Screening of the Cosmic Microwave Background". arXiv.2401.13033 (2024). [Link]

    Contribution: Co-led investigation of analysis choices and biases; performed significant manuscript writing.

12. **T. Schutt**, A. S. Maniyar, E. Schaan *et al.* [5 authors]. "New 'Temperature Inversion' Estimator to Detect CMB Patchy Screening by Large-Scale Structure". *PRD* 109 10 103539 (2024). [Link]

    Contribution: Performed all analysis for the novel estimators and majority of manuscript writing; contributed to THUMBSTACK *software package.*

11. K. Mori, C. J. Hailey, **T. Schutt** *et al.* [9 authors]. "The X-Ray Binary Population in the Galactic Center Revealed through Multi-decade Observations". *ApJ* 921 148 (2021). [Link]

    Contribution: Performed almost all analysis and significant manuscript writing.

Other Publications

10. D. Anbajagane, M. Tabbutt, J. Beas-Gonzalez *et al.* [**T. Schutt**: 24 of 81 authors]. "Dark Energy Survey Year 6 Results: Synthetic-source Injection Across the Full Survey Using Balrog". *OJAp* 8 65 (2025). [Link]

    Contribution: Led PSF modeling and co-led construction of the METADETECTION *shape catalog, inputs to this analysis.*

9. W. d'Assignies, G. M. Bernstein, B. Yin *et al.* [**T. Schutt**: 29 of 93 authors]. "Dark Energy Survey Year 6 Results: Clustering-redshifts and importance sampling of Self-Organised-Maps $n(z)$ realizations for 3×2pt samples". arXiv:2510.23565 (2025). [Link]

    Contribution: Co-led construction of the METADETECTION *shape catalog, an input to this analysis.*

8. J. Jefferson, Y. Omori, C. Chang *et al.* [**T. Schutt**: 13 of 15 authors]. "Reanalysis of Stage-III Cosmic Shear Surveys: A Comprehensive Study of Shear Diagnostic Tests". arXiv.2505.03964 (2025). [Link]

    Contribution: Performed manuscript editing as a DESC Collaboration internal reviewer.

7. M. Rodríguez-Monroy, N. Weaverdyck, J. Elvin-Poole *et al.* [**T. Schutt**: 57 of 64 authors]. "Dark Energy Survey Year 6 Results: Improved Mitigation of Spatially Varying Observational Systematics with Masking". arXiv.2509.07943 (2025). [Link]

    Contribution: DES Builder: essential contributions to collaboration infrastructure and analysis.

6. B. Thakore, M. Negro, M. Regis *et al.* [**T. Schutt**: 9 of 99 authors]. "High-Significance Detection of Correlation between the Unresolved Gamma-Ray Background and the Large-Scale Cosmic Structure". *JCAP* 2025 037 (2025). [Link]

    Contribution: Performed significant manuscript editing as a DES Collaboration internal reviewer.

5. M. Yamamoto, M. R. Becker, E. Sheldon *et al.* [**T. Schutt**: 9 of 86 authors]. "Dark Energy Survey Year 6 Results: Cell-based Coadds and METADETECTION Weak Lensing Shape Catalogue". *MNRAS* (2025). [Link]

    Contribution: Co-led analysis team; performed PSF-related analysis and minor manuscript editing.

4. B. Yin, A. Amon, A. Campos *et al.* [**T. Schutt**: 29 of 96 authors]. "Dark Energy Survey Year 6 Results: Redshift Calibration of the Weak Lensing Source Galaxies". arXiv:2510.23566 (2025). [Link]

   Contribution: Co-led construction of the METADETECTION *shape catalog, an input to this analysis.*

3. J. H. Esteves, Y. Utsumi, A. Snyder *et al.* [**T. Schutt**: 4 of 17 authors]. "Photometry, Centroid and Point-spread Function Measurements in the LSST Camera Focal Plane Using Artificial Stars". *PASP* 135 115003 (2023). [Link]

   Contribution: Performed early versions of most of the analyses and minor manuscript editing.

2. K. Mori, H. An, Q. Feng *et al.* [**T. Schutt**: 6 of 12 authors]. "Multiwavelength Observations of 2HWC J1928+177: Dark Accelerator or New TeV Gamma-Ray Binary?" *ApJ* 897 129 (2020). [Link]

   Contribution: Performed pulsar spectral energy distribution (SED) fitting and related manuscript writing.

1. K. Mori, C. J. Hailey, S. Mandel *et al.* [**T. Schutt**: 4 of 17 authors]. "NuSTAR and Chandra Observations of New X-Ray Transients in the Central Parsec of the Galaxy". *ApJ* 885 142 (2019). [Link]

   Contribution: Performed NuSTAR spectral fitting (main analysis) and related manuscript writing.

Conference Proceedings (Non-refereed)

3. A. Roodman, A. Rasmussen, A. Bradshaw *et al.* [**T. Schutt**: 17 of 76 authors]. "LSST Camera Verification Testing and Characterization". *SPIE Ground-Based and Airborne Instrumentation for Astronomy X*. 130961S (2024). [Link]

2. Y. Utsumi, P. Antilogus, P. Astier *et al.* [**T. Schutt**: 27 of 33 authors]. "LSST Camera Focal Plane Optimization". *SPIE X-Ray, Optical, and Infrared Detectors for Astronomy XI*. 131030W (2024). [Link]

1. R. Krivonos, C. Hailey, K. Mori *et al.* [**T. Schutt**: 9 of 9 authors]. "Observations of the X-ray Source Population in the Galactic Center". *New Horizons in Galactic Center Astronomy and Beyond*. 139 (2021). [Link]