Stacy Y. Kim

Carnegie Theoretical Astrophysics Center (CTAC), Carnegie Observatories
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Research Interests: **Formation and evolution of dwarf galaxies**. High resolution cosmological, hydrodynamical simulations of galaxies. Semi-empirical models of dwarf galaxy formation. **Astrophysical probes of dark matter**. Near-field cosmology. Constraints based on populations of dwarf galaxies. Self-interacting dark matter. Merging galaxy clusters.

Education & Experience

2023– **Carnegie Observatories**, Pasadena, CA
Nashman / CTAC Postdoctoral Fellow

2019-2023 **University of Surrey**, Guildford, Surrey, UK
Postdoctoral Research Fellow

Aug. 2019 **The Ohio State University**, Columbus, OH
Ph.D. in Astronomy
University Fellow, Presidential Fellow
- Thesis: *Constraining Dark Matter Properties with Dwarf Galaxies and Galaxy Clusters*
- Advisor: Annika H.G. Peter

June 2013 **California Institute of Technology**, Pasadena, CA
B.S. in Physics
- Thesis: *X-Ray Ionization of Planet-Opened Gaps in Protostellar Disks*
- Advisor: Neal J. Turner

Honors, Awards, & Grants

Funding and Awards History

2024-2026	JWST Cycle 3 Program: Silver Bullet for Dark Matter (Co-I; PIs: M. Bradac, G. Rihtarsic)	$150,901
2019	Presidential Fellowship, OSU	$20,900
2018	Ann S. Tuttle Graduate Student Paper Prize (best 1st-author paper), OSU Astronomy	—
2013	OSU Center for Cosmology and AstroParticle Physics Early Start Award	∼$1,500
2013	University Fellowship for Graduate Studies, OSU	$23,000
2013	Astronomy Graduate Recruitment Bonus, OSU Astronomy	$5,000
2009	National Merit Scholar	$2,000

Computing and Telescope Allocations

2025	Magellan: ID-MAGE - Distances to Diffuse Dwarf Satellites (PI: Kim, Hunter, Mutlu-Pakdil)	1.5 nights
2024-2026	JWST Cycle 3 Program: Silver Bullet for Dark Matter (Co-I; PIs: M. Bradac, G. Rihtarsic)	26 hrs
2024-2026	DiRAC HPC: EDGE3.0 - From first light to massive black hole seeds (Co-I; PI: J.I. Read)	151M CPU-hrs
2021-2023	DiRAC HPC: EDGE2.0 - Resolving light & dark in isolated dwarfs (Co-I; PI: J.I. Read)	44M CPU-hrs

Publications Summary

38 total, including 32 refereed/submitted and 6 white papers. 1500+ citations, h-index: 19 (ADS).
A full list of publications is at the end of this CV.

Presentations (selected)

Invited Talks

2025	UVA/NRAO TUNA Talk	Charlottesville, VA, US
	George Mason Physics & Astronomy Colloquium	Fairfax, VA, US
	EAS "Novel probes for dark matter on galactic scales" Symposium	Cork, IR
	University of Arizona Galaxies Lunch Talk (postponed)	Tucson, AZ, US
	Princeton Dark Cosmos Seminar	Princeton, NJ, US
	UCSD/SDSU Astronomy & Astrophysics Colloquium	San Diego, CA, US
2024	Dartmouth Astro Journal Club	Hanover, NH, US
	USC CosmoLab Seminar	Los Angeles, CA, US
	LSST/DESC Dark Matter Working Group Telecon	virtual
	UCLA Naoz Group Meeting	Los Angeles, CA, US
	Pomona Physics Colloquium	Pomona, CA, US
2023	SEPnet Conference: The Imitation Game	Milton Keynes, UK
2022	Portsmouth Institute of Cosmology and Gravitation Colloquium	Portsmouth, UK
	News from the Dark 7 Mini-Workshop	Montpellier, FR
	UC Davis Cosmology and Astronomy Seminar (remote)	Davis, CA, US
2021	University of Arizona Galaxy Crawl Talk (remote)	Tucson, AZ, US
2020	Durham University Friday Lunchtime Astronomy Talk (remote)	Durham, UK
	OSU Dark Matter Mini-Workshop (remote)	Columbus, OH, US
	University of Pittsburgh Langley Astrophysics Seminar	Pittsburgh, PA, US
2019	UIUC Astrophysics, Gravitation and Cosmology Seminar	Champaign, IL, US
2018	University of Chicago Open Group Seminar	Chicago, IL, US
2017	Jet Propulsion Laboratory Astrophysics Luncheon Seminar	La Cañada Flintridge, CA, US

Contributed Talks

2025	Small-Scale Structure of the Universe and Self-Interacting Dark Matter Workshop	Valencia, SP
	Southern California Dark Matter (SoCalDM) Workshop	Irvine, CA, US
2024	Galaxy Formation and Evolution in Southern California (GalFRESCA) 2024	Pasadena, CA, US
	Small Galaxies, Cosmic Questions II	Durham, UK
	Dwarf Galaxies, Star Clusters, and Streams in the LSST Era (withdrew for medical sit.)	Chicago, IL
	KITP Cosmic Signals of Dark Matter Physics: New Synergies	Santa Barbara, CA, US
2023	National Astronomy Meeting 2023 (remote)	Cardiff, UK
	Self-Interacting Dark Matter: Models, Simulations and Signals	Pollica, IT
	RAMSES User Meeting 2023	Oxford, UK
	IAUS 379: "Dynamical Masses of Local Group Galaxies"	Potsdam, GR
2022	EAS SS8: "Dwarf galaxies beyond the Local Group"	Valencia, SP
2019	Small Galaxies, Cosmic Questions	Durham, UK
	233rd AAS Meeting, dissertation talk	Seattle, WA, US
2018	Substructure Lensing with Galacticus Workshop	Columbus, OH, US
	Near-Field Cosmology with DES DR1 and Beyond Workshop	Chicago, IL, US
	Quarks to the Cosmos (2018 April APS Meeting)	Columbus, OH, US
	Probing the Nature of Dark Matter with the LSST Workshop (flash talk)	Pittsburgh, PA, US
2017	TeV Particle Astrophysics (TeVPA) 2017	Columbus, OH, US
2016	Ohio Supercomputer Center Statewide Users Group Conference	Columbus, OH, US
	COSMO-16	Ann Arbor, MI, US

Posters

2021	EAS S12: The Renaissance of the Low Surface Brightness Universe	virtual
2018	KITP DM Detection and Detectability: Paradigm Confirmation or Shift?	Santa Barbara, CA, US
2016	227th AAS Meeting	Kissimmee, FL, US

Research Supervision

Daggers mark publications by advisees († denotes refereed/submitted papers, ‡ denotes advanced drafts).

Postdoctoral projects

2022– • Susan Hutton (Surrey)

Graduate student projects

2024– • Jimmy Wen (USC) with A. Robertson, A.H.G. Peter, V. Gluscevic
2024– • ‡ Izzy Gray (Surrey) with J. Read
2023– • Nicole Gountanis (OSU) with I. Esteban, A.H.G. Peter
2022-2024 • † Adriana Dropulic (Princeton) with N. Shipp, L. Necib, M. Lisanti
2022-2023 • ‡ Emily Charles (Surrey)
2018-2019 • † Carton Zeng (OSU) with A.H.G. Peter

Masters theses

2022 • Yohei Hori (Surrey)

Undergraduate projects

2024– • Katie Hermanson (CSU East Bay)
2024– • Bharat Bhatt (Surrey, starting Ph.D. at Strasbourg in fall 2025)
2021– • ‡ Sushanta Nigudkar (Kent, starting Ph.D. at Antwerp in fall 2025)

Teaching & Mentoring

2025 **Guest lecture** on the dynamics of galaxy mergers, co-taught with A. Robertson, USC

2024 **Carnegie Astrophysics Summer Student Internship** (CASSI) **Program**, Carnegie
- Organized 8-week Research Talks series given by Carnegie postdocs for summer undergrad interns
- Co-taught "Telling Scientific Stories with Visualizations" workshop
- Co-taught "Making and Presenting a Scientific Poster" workshop
- Helped with "Intro to HPC" workshop
- Gave feedback on practice talks, held office hours for posters

2022 **Tutor (TA)**, Year 1 Physics, Surrey

2021 **Demonstrator (lab TA)**, PHY 1038 "Mathematical and Computational Physics", Surrey

2018-2019 **Polaris Graduate Student Mentor** for undergrads from underrepresented groups, OSU

2016 **Graduate TA**, ASTRON 3350 "Methods of Observational Astronomy & Data Analysis", OSU

Professional Service & Leadership

Departmental Service

2024– Carnegie Tea (daily arXiv discussion) Co-organizer, Carnegie
2021-2023 Surrey EDGE Journal Club Organizer, Surrey
2019-2023 Astrophysics Seminar Organizer, Surrey
2019-2021 Physics EDI Committee, Early Career Research Representative, Surrey

Conferences Organized

Sep. 2024 Galaxy Formation and Evolution in Southern California (GalFRESCA), SOC member, Pasadena, CA
Nov. 2020 REACH Research Culture Week Co-organizer and webmaster, Guildford, Surrey, UK (virtual)

Collaboration Membership

2025– Member, Roman Science Collaboration (RSC)
2022– Member, LSST Dark Energy Science Collaboration (DESC)
2021-2023 Junior Associate, LSST:UK

2020– Member, Merian Survey
2019– **Builder**, Engineering Dwarfs at Galaxy Formation's Edge (EDGE) Collaboration

Others

Referee for Monthly Notices of the Royal Astronomical Society | The Astrophysical Journal
Reviewer for UKRI | Royal Society | NASA ATP | ISF

Outreach (selected)

Given 50+ shows/talks for public events, local schools, and groups. Wrote 30+ articles for undergrads.

2023– **Community outreach volunteer**. Astrophysics demos for local schools and events in Pasadena.
2022 ***I'm a Scientist*, Space Zone scientist**. Live, text-based chats with especially disadvantaged students and those from underserved schools on science and being a scientist.
2022 **World Space Week, Guildford High Street Takeover**. Chats with public about the EDGE sims.
2022 **Interview for *Mission Astro***. For astronomy course for high school and adult learners.
2019 **Public talk for Café Scientifique Woking**
2019 **Public talk for Surrey stargazing night**
2014-2017 **Editor, Astrobites**
- Wrote 30+ posts for Astrobites, an arXiv blog for undergrads by graduate students
- Two years on the Hiring Committee; read applications and selected writers for the editorial staff

2016–2018 **STEAM Lecture Series Co-Organizer**
- Awarded ~$25K from the STEAM Project (funded by Fuller Seminary)
- Organized 4-part interdisciplinary discussion series between scientists, philosophers, and theologians on topics spanning love, death, and the rise of AI.

2013–2019 **Planetarium show presenter and developer**, Arne Slettebak Planetarium, OSU
- Presented 40+ planetarium shows and helped develop extensive show content.
- Attended the 2014 Spitz Summer Institute to learn advance show development techniques.

2013–2014 **Volunteer, OSU Astronomy Public Roof Nights and Star Parties**

Publications

38 total, including 32 refereed/submitted and 6 white papers. 1500+ citations, h-index: 19 (ADS).
Daggers (†) denote work led by students I advised or co-advised.

Major Contributor

Includes work in which I was a major contributor to the analysis and/or writing.

32. Taylor, E., Read, J. I., Orkney, M. D. A., **Kim, S. Y.**, and 4 coauthors. *"The emergence of globular clusters and globular cluster-like dwarfs"*, accepted to Nature (8/2025)
31. Drouplic, A.†, Shipp, N., **Kim, S. Y.**, and 3 coauthors. *"StreamGen: Connecting Populations of Streams and Shells to Their Host Galaxies"*, accepted to ApJ (7/2025), arXiv/astro-ph: 2409.13810
30. **Kim, S. Y.**, Read, J. I., Rey, M. P., and 6 coauthors. *"EDGE: Predictable Scatter in the Stellar Mass–Halo Mass Relation of Dwarf Galaxies"*, submitted to MNRAS, arXiv/astro-ph: 2408.15214
29. **Kim, S. Y.**, Peter, A. H. G., *"The Milky Way satellite velocity function is a sharp probe of small-scale structure problems"*, arXiv/astro-ph: 2106.09050
28. **Kim, S. Y.**, Turner, N. J. *"X-Ray Ionization of Planet-Opened Gaps in Protostellar Disks"*, 2020, ApJ, 889, 159
27. **Kim, S. Y.**, Peter, A. H. G., Hargis, J. R. *"Missing Satellites Problem: Completeness Corrections to the Number of Satellite Galaxies in the Milky Way are Consistent with Cold Dark Matter Predictions"*, 2018,

Physical Review Letters, 121, 211302 ("Editors' Suggestion")

26. **Kim, S. Y.**, Peter, A. H. G., Wittman, D. *"In the Wake of Dark Giants: New Signatures of Dark Matter Self-Interactions in Equal Mass Mergers of Galaxy Clusters"*, 2017, MNRAS, 469, 1414

Co-Authored

25. Danieli, S., Kado-Fong, E., Huang, S., and 32 coauthors, including **Kim, S. Y.**, *"Merian: A Wide-Field Imaging Survey of Dwarf Galaxies at z∼0.06-0.10"*, accepted to ApJ (8/2025), arXiv/astro-ph: 2410.01884
24. Rey, M. P., Taylor, E., Gray, E. I., **Kim, S. Y.**, and 13 coauthors, *"EDGE: the emergence of dwarf galaxy scaling relations from cosmological radiation-hydrodynamics simulations"*, 2025, MNRAS, 541, 1195
23. Mancera Piña, P. E., Read, J. I., **Kim, S. Y.**, and 5 coauthors, *"The galaxy-halo connection of disc galaxies over six orders of magnitude in stellar mass"*, 2025, A&A, 699, A311
22. Gray, E. I., Read, J. I., Taylor, E., and 8 coauthors, including **Kim, S. Y.**, *"EDGE: A new model for Nuclear Star Cluster formation in dwarf galaxies"*, 2025, MNRAS, 539, 1167
21. Hussein, A., Necib, L., Kaplinghat, M., **Kim, S. Y.**, and 4 coauthors, *"Theoretical Predictions for the Inner Dark Matter Distribution in the Milky Way Informed by Simulations"*, submitted to the Physical Review (1/2025), arXiv/astro-ph: 2405.19286
20. Muni, C., Pontzen, A., Read, J. I., and 5 coauthors, including **Kim, S. Y.**, *"EDGE: Dark Matter Core Creation Depends on the Timing of Star Formation"*, 2025, MNRAS, 536, 314
19. Esteban, I., Peter, A. H. G., **Kim, S. Y.**, *"Milky Way satellite velocities reveal the dark matter power spectrum at small scales"*, 2024, PRD, 110, 123013
18. Rey, M. P., Orkney, M. D. A., Read, J. I., and 6 coauthors, including **Kim, S. Y.**, *"EDGE: Dark matter or astrophysics? Breaking dark matter heating degeneracies with H I rotation in faint dwarf galaxies"*, 2024, MNRAS, 529, 2379
17. Goater, A., Read, J. I., Noel, N. E. D., and 9 coauthors, including **Kim, S. Y.**, *"EDGE: The direct link between mass growth history and the extended stellar haloes of the faintest dwarf galaxies"*, 2024, MNRAS, 525, 3516
16. Orkney, M. D. A., Taylor, E., Read, J. I., and 5 coauthors, including **Kim, S. Y.**, *"EDGE: the shape of dark matter haloes in the faintest galaxies"*, 2023, MNRAS, 525, 3516
15. Doliva-Dolinsky, A., Martin, N. F., Yuan, Z., and 8 coauthors, including **Kim, S. Y.**, *"The PAndAS View of the Andromeda Satellite System. IV. Global Properties"*, 2023, ApJ, 952, 72
14. Shipp, N., Panithanpaisal, N., Necib, L., and 18 coauthors, including **Kim, S. Y.**, *"Streams on FIRE: Populations of Detectable Stellar Streams in the Milky Way and FIRE"*, 2023, ApJ, 949, 44
13. Charles, E. J. E., Collins, M. L. M., Rich, R. M., and 7 coauthors, including **Kim, S. Y.**, *"Andromeda XXV—a dwarf galaxy with a low central dark matter density"*, 2023, MNRAS, 521, 3527
12. Orkney, M. D. A., Read, J. I., Agertz, O., and 6 coauthors, including **Kim, S. Y.**, *"EDGE: the puzzling ellipticity of Eridanus II's star cluster and its implications for dark matter at the heart of an ultra-faint dwarf"*, 2022, MNRAS, 515, 185
11. Zeng, C. Z.†, Peter, A. H. G., Du, X., and 5 coauthors, including **Kim, S. Y.**. *"Core-collapse, evaporation and tidal effects: the life story of a self-interacting dark matter subhalo"*, 2022, MNRAS, 513, 4845
10. Rey, M. P., Pontzen, A., Agertz, O., and 5 coauthors, including **Kim, S. Y.**, *"EDGE: What shapes the relationship between H I and stellar observables in faint dwarf galaxies?"*, 2022, MNRAS, 511, 5672
9. Orkney, M. D. A., Read, J. I., Rey, M. P., and 6 coauthors, including **Kim, S. Y.**, *"EDGE: two routes to dark matter core formation in ultra-faint dwarfs"*, 2021, MNRAS, 504, 3509
8. Horne, K., De Rosa, G., Peterson, B. M., and 152 coauthors, including **Kim, S. Y.** *"Space Telescope and Optical Reverberation Mapping Project. IX. Velocity-Delay Maps for Broad Emission Lines in NGC 5548"*, 2021, ApJ, 907, 76
7. Williams, P.R., Pancoast, A., Treu, T., and 155 coauthors, including **Kim, S. Y.** *"Space Telescope and Optical Reverberation Mapping Project. XII. Broad-line Region Modeling of NGC 5548"*, 2020, ApJ, 902, 74
6. Kriss, G. A., De Rosa, G., Ely, J., and 164 coauthors, including **Kim, S. Y.** *"Space Telescope and Optical Reverberation Mapping Project. VIII. Time Variability of Emission and Absorption in NGC 5548 Based on*

Modeling the Ultraviolet Spectrum", 2019, ApJ, 881, 153

5. De Rosa, G., Fausnaugh, M. M., Grier, C. J., and 99 coauthors, including **Kim, S. Y.** *"Velocity-Resolved Reverberation Mapping of Five Bright Seyfert 1 Galaxies"*, 2018, ApJ, 866, 133
4. Fausnaugh, M. M., Starkey, D. A., Horne, K., and 69 coauthors, including **Kim, S. Y.** *"Continuum Reverberation Mapping of the Accretion Disks in Two Seyfert 1 Galaxies"*, 2018, ApJ, 854, 107
3. Mathur, S., Gupta, A., Page, K., and 147 coauthors, including **Kim, S. Y.** *"Space Telescope and Optical Reverberation Mapping Project. VII. Understanding the UV anomaly in NGC 5548 with X-Ray Spectroscopy"*, 2017, ApJ, 846, 55
2. Fausnaugh, M. M., Grier, C. J., Bentz, M. C. and 69 coauthors, including **Kim, S. Y.** *"Reverberation Mapping of Optical Emission Lines in Five Active Galaxies"*, 2017, ApJ, 840, 97
1. Pei, L., Fausnaugh, M. M., Barth, A. J., and 153 coauthors, including **Kim, S. Y.** *"Space Telescope and Optical Reverberation Mapping Project. V. Optical Spectroscopic Campaign and Emission-Line Analysis for NGC 5548"*, 2017, ApJ, 837, 131

White Papers

6. Bechtol, K., Birrer, S., Cyr-Racine, F.-Y., and 40 coauthors, including **Kim, S. Y.** *"Snowmass2021 Cosmic Frontier White Paper: Dark Matter Physics from Halo Measurements"*, 2022, arXiv/astro-ph:2203.07354
5. Mao, Y.-Y., Peter, A. H. G., Adhikari, S., and 30 coauthors, including **Kim, S. Y.** *"Snowmass2021: Vera C. Rubin Observatory as a Flagship Dark Matter Experiment"*, 2022, arXiv/astro-ph:2203.07252
4. Banerjee, A., Boddy, K. K., Cyr-Racine, F.-Y., and 15 coauthors, including **Kim, S. Y.** *"Snowmass2021 Cosmic Frontier White Paper: Cosmological Simulations for Dark Matter Physics"*, 2022, arXiv/astro-ph:2203.07049
3. Li, T., Kaplinghat, M., Pace, A. B., and 54 coauthors, including **Kim, S. Y.** *"Dark Matter Physics with Wide Field Spectroscopic Surveys"*, 2019, Bulletin of the American Astronomical Society, 51, 252
2. The MSE Science Team, Babusiaux, C., Bergemann, M., and 261 coauthors, including **Kim, S. Y.** *"The Detailed Science Case for the Maunakea Spectroscopic Explorer, 2019 edition"*, 2019, arXiv/astro-ph:1904.04907
1. Li, T., Kaplinghat, M., Bechtol, K., and 27 coauthors, including **Kim, S. Y.** *"Astrophysical Tests of Dark Matter with Maunakea Spectroscopic Explorer"*, 2019, arXiv/astro-ph:1903.03155

References

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