KUNG-YI SU

CIERA ◇ Northwestern University
1800 Sherman Avenue, 8th Floor ◇ Evanston, IL 60201
(515) · 817 · 3019 ◇ kungyisu@gmail.com ◇ http://www.kungyisu.com

EDUCATION

California Institute of Technology (Caltech), Pasadena *June 2019*
Ph.D. in physics
Advisor: Prof. Philip F. Hopkins

National Taiwan University (NTU), Taipei *June 2010*
B.S. in physics
Advisor: Prof. Pisin Chen

EMPLOYMENT

CIERA, Northwestern University September 2025 –
Research Assistant Professor *Northwestern University*

Black Hole Initiative, Harvard University September 2022 - August 2025
BHI Fellow *Harvard University*

Department of Astronomy, Columbia University August 2020 - August 2022
Joint Flatiron Institute–Columbia University Fellow *Columbia University*

Center for Computational Astrophysics, Flatiron Institute August 2019 - August 2020
Joint Flatiron Institute–Columbia University Fellow *Simons Foundation*

Department of Physics, Caltech September 2011 - August 2019
Teaching Assistant/Graduate Research Assistant *Caltech*

LeCosPA December 2008 - July 2010
Undergraduate Researcher *NTU*

LEADERSHIP EXPERIENCE

- Co-leader – SMAUG Black Hole Working Group (Summer 2020 - Fall 2021)
- SOC member – New England FOLIAGE 2024: FIRE mOdeLIng And Galaxy Evolution workshop (Nov. 2024)
- LOC member – Bridging Scale Workshop (May 2024)
- Co-organizer – Writing Workshop (May 2017)

AWARDS

- FIRE Award for Distinguished Service and Leadership (2024)
- Burke Graduate Fellowship (Fall 2018 - Spring 2019)
- Groce travel funding (Dec. 2018)
- NTU President Award (2006); Dean Award (2010)
- LeCosPA Outstanding Student Research Award (2009)

STUDENT MENTORING/CO-MENTORING

- **Nadia Qutob** – Undergraduate – Georgia Institute of Technology & Harvard REU Program
  (Currently a graduate student at OSU)
  — Nadia studied the signatures of different AGN jet models on ion distributions and published a first-author paper in ApJ (Qutob et al. 2024).
- **Manami Roy** – Graduate – Raman Research Institute & CCA Predoctoral Fellow
  (Currently a CCAPP Fellow at OSU)
  — Manami studied the effects of satellites, compressive heating, and cosmic rays on the host CGM, leading to two first-author papers in MNRAS and ApJ (Roy et al. 2024, 2025a) and a third first-author paper currently on arXiv and submitted to ApJ (Roy et al. 2025b).
- **Marguerite Adrienne Epstein-Martin** – Graduate – Columbia University
  — Marguerite studied the propagation of AGN feedback from stellar-mass black holes in supermassive black hole accretion disk environments.
- **Elizabeth Marie Mone** – Graduate – Northwestern University
  — Elizabeth studies the energy balance in the inner CGM and how it affects inner CGM virialization.

COMPUTING AWARDS

PI – Frontera Pathway AST22010 2022-2025	34.1M CPU-hours (608,350 SUs)	"A Systematic Study of How AGN Feedback Regulates the Black Hole Accretion in Early Protogalaxies"
PI – XSEDE XRAC/ACCESS Maximize TG-PHY220047 2022-2025	80.75M CPU-hours value $\sim$ \$744,930	"A Systematic Study of AGN Jet and Black Hole Accretion in Massive Galaxies"
PI – XSEDE Startup/ACCESS Explore TG-PHY220027 2022-2025	650k CPU-hours	"AGN feedback across multiple scales"

SERVICE

- Referee: MNRAS (2018−), ApJL (2022−), ApJ (2023−), A&A (2023−), Galaxies (2025−), Universe (2025−)
- Chambliss poster judge, AAS (233, 235, 240, 245)
- Session Chair, AAS (245)

OUTREACH

- Forum for undergraduate/master students at ASIAA in Taiwan – "Studying galaxy evolution as an international student at Caltech" – Speaker (Dec. 2018)
- Stargazing and Lecture Series – Telescope volunteer (May 2016; Aug. 2016)
- NTU Physics Camp (for high school students) – Co-organizer (2007, 2008)

TEACHING EXPERIENCE

Ph 2	Wave, Quantum and Statistical Mechanics (Non-physics majors)
Ph 12	Wave, Quantum and Statistical Mechanics (Physics majors)
Ph 106c	Topics in Classical Physics: Electromagnetism and Introduction to Classical Optics
Ph 125	Quantum Mechanics
Ph 136c	Applications of Classical Physics: General Relativity
Ph 199	Frontiers of Fundamental Physics

COLLABORATIONS

FIRE, SMAUG, LtU

SKILLS

Python, IDL, C, MPI

PUBLICATIONS

NASA ADS (total: 48 - refereed: 42 - 1st author: 15 - citations: 3021 - h-index: 24 - 2026-02-17)

First Author

1. **K.-Y. Su**, A. Ricarte, P. Natarajan, A. J. Porras-Valverde, H. Cho, R. Narayan, C.-A. Faucher-Giguère, et al. "Bridging Scales: How Much Do Supermassive Black Holes Grow in the Suppressed Bondi Regime?", *The Astrophysical Journal Letters* Vol. 998, Issue 1, p. L18 (2026)
2. **K.-Y. Su**, G. L. Bryan, P. F. Hopkins, et al. "Modeling Cosmic Rays at AGN Jet-Driven Shock Fronts", MNRAS Vol. 545, Issue 2, staf2060 (2025)
3. **K.-Y. Su**, P. Natarajan, H. Cho, R. Narayan, P. F. Hopkins, et al. "Bridging Scales: Coupling the Galactic Nucleus to the Larger Cosmic Environment", ApJ Letters Vol. 981, Issue 2, p. L33 (2025)
4. **K.-Y. Su**, G. L. Bryan, and Z. Haiman. "Self-regulation of high-redshift black hole accretion via jets: challenges for SMBH formation", MNRAS Vol. 538, Issue 1, pp. 11–30 (2025)
5. **K.-Y. Su**, G. L. Bryan, C. C. Hayward, R. S. Somerville, P. F. Hopkins, et al. "Unravelling jet quenching criteria across L* galaxies and massive cluster ellipticals", MNRAS Vol. 532, Issue 2, pp. 2724–2740 (2024)
6. **K.-Y. Su**, G. L. Bryan, Z. Haiman, R. S. Somerville, et al. "Self-regulation of black hole accretion via jets in early protogalaxies", MNRAS Vol. 520, Issue 3, pp. 4258–4275 (2023)
7. **K.-Y. Su**, P. F. Hopkins, G. L. Bryan, R. S. Somerville, C. C. Hayward, et al. "Which AGN jets quench star formation in massive galaxies?", MNRAS Vol. 507, Issue 1, pp. 175–204 (2021)
8. **K.-Y. Su**, P. F. Hopkins, C. C. Hayward, et al. "Cosmic rays or turbulence can suppress cooling flows (where thermal heating or momentum injection fail)", MNRAS Vol. 491, Issue 1, pp. 1190–1212 (2020)
9. **K.-Y. Su**, P. F. Hopkins, C. C. Hayward, et al. "The failure of stellar feedback, magnetic fields, conduction, and morphological quenching in maintaining red galaxies", MNRAS Vol. 487, Issue 3, pp. 4393–4408 (2019)
10. **K.-Y. Su**, C. C. Hayward, P. F. Hopkins, et al. "Stellar feedback strongly alters the amplification and morphology of galactic magnetic fields", MNRAS Vol. 473, Issue 1, pp. L111–L115 (2018)
11. **K.-Y. Su**, P. F. Hopkins, C. C. Hayward, et al. "Discrete effects in stellar feedback: Individual Supernovae, Hypernovae, and IMF Sampling in Dwarf Galaxies", MNRAS Vol. 480, Issue 2, pp. 1666–1675 (2018)
12. **K.-Y. Su**, P. F. Hopkins, C. C. Hayward, et al. "Feedback first: the surprisingly weak effects of magnetic fields, viscosity, conduction and metal diffusion on sub-L* galaxy formation", MNRAS Vol. 471, Issue 1, pp. 144–166 (2017)
13. **K.-Y. Su** et al. "Solving the cusp-core problem with a novel scalar field dark matter", JCAP Vol. 2011, Issue 8, p. 016 (2011)
14. **K.-Y. Su** et al. "Comments on "Remarks on the spherical scalar field halo in galaxies"", arXiv: 1009.0869 (2010)
15. **K.-Y. Su** et al. "Comment on "Modeling galaxy halos using dark matter with pressure"", PRD Vol. 79, Issue 12, p. 128301 (2009)

Other Publications († indicates mentee-led papers)

1. H. Cho, B. S. Prather, R. Narayan**, K.-Y. Su**, et al. "Bridging Scales in Black Hole Accretion and Feedback: Subgrid Prescription from First Principles", arXiv: 2602.15560 (2026)
2. A. Marszewski, C.-A. Faucher-Giguère, G. Sun, D. Anglés-Alcázar, R. Feldmann**, K.-Y. Su**, et al. "Little Red Dots on FIRE: The Ability of Bursty Galaxies to Host an Abundant Population of High-Redshift AGN", arXiv: 2601.22213 (2026)
3. C. Goyal, S. B. Ponnada, P. F. Hopkins, S. Wellons, J. A. Benavides**, and K.-Y. Su**. "Effects of Varied Cosmic Ray Feedback from AGN on Massive Galaxy Properties", arXiv: 2512.11062 (2025)
4. A. J. Porras-Valverde, P. Natarajan, A. Ricarte**, K.-Y. Su**, H. Cho, R. Narayan, et al. "Bridging scales: Modeling suppressed Bondi accretion on black holes and its impact on galaxy growth", arXiv: 2511.08683 (2025)
5. †M. Roy**, K.-Y. Su**, S. Tonnesen, et al. "To Survive or to Shatter: The Impact of Cosmic Rays on the Fate of Stripped Cold Clouds", arXiv: 2510.21699 (2025)
6. †M. Roy**, K.-Y. Su**, S. Mathur, et al. "Where is the Supervirial Gas? The Supply from Hot Inflows", ApJ Vol. 988, Issue 1, p. 71 (2025)
7. A. Wetzel, J. Samuel, P. J. Gandhi, S. B. Ponnada**, K.-Y. Su**, et al. "Second public data release of the FIRE-2 cosmological zoom-in simulations of galaxy formation", arXiv: 2508.06608 (2025)
8. H. Cho et al. "Bridging Scales in Black Hole Accretion and Feedback: Relativistic Jet Linking the Horizon to the Host Galaxy", ApJ Vol. 995, Issue 1, p. 122 (2025)
9. R. Emami, L. Hernquist, R. Smith, J. F. Steiner, G. Tremblay, D. Finkbeiner, M. Vogelsberger, J. Grindlay, F. Marinacci**, K.-Y. Su**, et al. "Unravelling the role of merger histories in the population of in situ stars: Linking IllustrisTNG cosmological simulation to H3 survey", PASA Vol. 42, e082 (2025)
10. C. Carr, G. L. Bryan, N. Garavito-Camargo, G. Besla, D. J. Setton, K. V. Johnston**, and K.-Y. Su**. "The All-sky Impact of the LMC on the Milky Way Circumgalactic Medium", ApJ Vol. 983, Issue 2, p. 151 (2025)
11. P. F. Hopkins**, K.-Y. Su**, et al. "Zooming In On The Multi-Phase Structure of Magnetically-Dominated Quasar Disks: Radiation From Torus to ISCO Across Accretion Rates", *The Open Journal of Astrophysics* Vol. 8, p. 48 (2025)
12. H. Cho, B. S. Prather**, K.-Y. Su**, R. Narayan, and P. Natarajan. "Multizone Modeling of Black Hole Accretion and Feedback in 3D GRMHD: Bridging Vast Spatial and Temporal Scales", ApJ Vol. 977, Issue 2, p. 200 (2024)
13. †N. Qutob, R. Emami**, K.-Y. Su**, et al. "Observational Signatures of AGN Feedback in the Morphology and the Ionization States of Milky Way-like Galaxies", ApJ Vol. 977, Issue 1, p. 72 (2024)
14. †M. Roy**, K.-Y. Su**, S. Tonnesen, D. B. Fielding, et al. "Seeding the CGM: how satellites populate the cold phase of milky way haloes", MNRAS Vol. 527, Issue 1, pp. 265–280 (2024)
15. J. Mercedes-Feliz, D. Anglés-Alcázar, B. K. Oh, C. C. Hayward, R. K. Cochrane, A. J. Richings, C.-A. Faucher-Giguère, S. Wellons, B. A. Terrazas, J. Moreno**, K.-Y. Su**, et al. "Dense stellar clump formation driven by strong quasar winds in the FIRE cosmological hydrodynamic simulations", MNRAS Vol. 530, Issue 3, pp. 2795–2809 (2024)
16. S. B. Ponnada, I. S. Butsky, R. Skalidis, P. F. Hopkins, G. V. Panopoulou, C. Hummels, D. Kereš, E. Quataert, C.-A. Faucher-Giguère**, and K.-Y. Su**. "Synchrotron signatures of cosmic ray transport physics in galaxies", MNRAS Vol. 530, Issue 1, pp. L1–L6 (2024)
17. S. B. Ponnada, G. V. Panopoulou, I. S. Butsky, P. F. Hopkins, R. Skalidis, C. Hummels, E. Quataert, D. Kereš, C.-A. Faucher-Giguère**, and K.-Y. Su**. "Synchrotron emission on FIRE: equipartition estimators of magnetic fields in simulated galaxies with spectrally resolved cosmic rays", MNRAS Vol. 527, Issue 4, pp. 11707–11718 (2024)
18. J. Stern, D. Fielding, Z. Hafen**, K.-Y. Su**, N. Naor, et al. "Accretion onto disc galaxies via hot and rotating CGM inflows", MNRAS Vol. 530, Issue 2, 1711–1731 (with Correction: MNRAS, Vol. 532, Issue 1, p. 995) (2024)

19. M. C. Smith, D. B. Fielding, G. L. Bryan, C.-G. Kim, E. C. Ostriker, R. S. Somerville, J. Stern**, K.-Y. Su**, et al. "ARKENSTONE - I. A novel method for robustly capturing high specific energy outflows in cosmological simulations", MNRAS Vol. 527, Issue 1, pp. 1216–1243 (2024)
20. P. F. Hopkins, J. Squire, E. Quataert, N. Murray**, K.-Y. Su**, et al. "An Analytic Model For Magnetically-Dominated Accretion Disks", *The Open Journal of Astrophysics* Vol. 7, p. 20 (2024)
21. P. F. Hopkins, J. Squire**, K.-Y. Su**, et al. "FORGE'd in FIRE II: The Formation of Magnetically-Dominated Quasar Accretion Disks from Cosmological Initial Conditions", *The Open Journal of Astrophysics* Vol. 7, p. 19 (2024)
22. P. F. Hopkins, M. Y. Grudic**, K.-Y. Su**, et al. "FORGE'd in FIRE: Resolving the End of Star Formation and Structure of AGN Accretion Disks from Cosmological Initial Conditions", *The Open Journal of Astrophysics* Vol. 7, p. 18 (2024)
23. H. Cho, B. S. Prather, R. Narayan, P. Natarajan**, K.-Y. Su**, et al. "Bridging Scales in Black Hole Accretion and Feedback: Magnetized Bondi Accretion in 3D GRMHD", ApJ Letters Vol. 959, Issue 2, p. L22 (2023)
24. J. Mercedes-Feliz, D. Anglés-Alcázar, C. C. Hayward, R. K. Cochrane, B. A. Terrazas, S. Wellons, A. J. Richings, C.-A. Faucher-Giguère, J. Moreno**, K.-Y. Su**, et al. "Local positive feedback in the overall negative: the impact of quasar winds on star formation in the FIRE cosmological simulations", MNRAS Vol. 524, Issue 3, pp. 3446–3463 (2023)
25. R. K. Cochrane, D. Anglés-Alcázar, J. Mercedes-Feliz, C. C. Hayward, C.-A. Faucher-Giguère, S. Wellons, B. A. Terrazas, A. Wetzel, P. F. Hopkins, J. Moreno, et al. "The impact of AGN-driven winds on physical and observable galaxy sizes", MNRAS Vol. 523, Issue 2, pp. 2409–2421 (2023)
26. R. Weinberger**, K.-Y. Su**, et al. "Active galactic nucleus jet feedback in hydrostatic haloes", MNRAS Vol. 523, Issue 1, pp. 1104–1125 (2023)
27. S. Wellons, C.-A. Faucher-Giguère, P. F. Hopkins, E. Quataert, D. Anglés-Alcázar, R. Feldmann, C. C. Hayward, D. Kereš**, K.-Y. Su**, et al. "Exploring supermassive black hole physics and galaxy quenching across halo mass in FIRE cosmological zoom simulations", MNRAS Vol. 520, Issue 4, pp. 5394–5412 (2023)
28. P. F. Hopkins, A. Wetzel, C. Wheeler, R. Sanderson, M. Y. Grudić, O. Sameie, M. Boylan-Kolchin, M. Orr, X. Ma, C.-A. Faucher-Giguère, D. Kereš, E. Quataert**, K.-Y. Su**, et al. "FIRE-3: updated stellar evolution models, yields, and microphysics and fitting functions for applications in galaxy simulations", MNRAS Vol. 519, Issue 2, pp. 3154–3181 (2023)
29. D. B. Fielding, S. Tonnesen, D. DeFelippis, M. Li**, K.-Y. Su**, et al. "First Results from SMAUG: Uncovering the Origin of the Multiphase Circumgalactic Medium with a Comparative Analysis of Idealized and Cosmological Simulations", ApJ Vol. 903, Issue 1, p. 32 (2020)
30. M. E. Orr, C. C. Hayward, A. M. Medling, A. B. Gurvich, P. F. Hopkins, N. Murray, J. L. Pineda, C.-A. Faucher-Giguère, D. Kereš, A. Wetzel**, and K.-Y. Su**. "Swirls of FIRE: spatially resolved gas velocity dispersions and star formation rates in FIRE-2 disc environments", MNRAS Vol. 496, Issue 2, pp. 1620–1637 (2020)
31. P. F. Hopkins, T. K. Chan, S. Garrison-Kimmel, S. Ji**, K.-Y. Su**, et al. "But what about...: cosmic rays, magnetic fields, conduction, and viscosity in galaxy formation", MNRAS Vol. 492, Issue 3, pp. 3465–3498 (2020)
32. T. K. Chan, D. Kereš, P. F. Hopkins, E. Quataert**, K.-Y. Su**, et al. "Cosmic ray feedback in the FIRE simulations: constraining cosmic ray propagation with GeV γ-ray emission", MNRAS Vol. 488, Issue 3, pp. 3716–3744 (2019)
33. P. F. Hopkins, A. Wetzel, D. Kereš, C.-A. Faucher-Giguère, E. Quataert, M. Boylan-Kolchin, N. Murray, C. C. Hayward, S. Garrison-Kimmel, C. Hummels, R. Feldmann, P. Torrey, X. Ma, D. Anglés-Alcázar**, K.-Y. Su**, et al. "FIRE-2 simulations: physics versus numerics in galaxy formation", MNRAS Vol. 480, Issue 1, pp. 800–863 (2018)

RECENT PRESENTATIONS

Conferences

8th ICM Theory & Computation Workshop **(Invited)**	July 2026
Ringberg Conference: The Multiscale Environment of AGN across Cosmic Time **(Invited)**	Nov. 2025
245th Meeting of the AAS	Jan. 2025
New England FOLIAGE 2024 **(SOC)**	Nov. 2024
Ringberg Conference: Computational Galaxy Formation 2024 **(Invited)**	Oct. 2024
10th Galaxy Evolution Workshop **(Invited)**	Aug. 2024
7th ICM Theory & Computation Workshop **(Invited)**	June 2024
Aspen Workshop – Cosmic Ray Feedback in Galaxies and Galaxy Clusters **(Invited)**	May 2024
Bridging Scale Workshop **(LOC)**	May 2024
243rd Meeting of the AAS	Jan. 2024
International Conference on Resolving Galaxy Ecosystems Across All Scales	Dec. 2023
Black Hole on Broadway	Dec. 2023
CR Workshop in Lyon **(Invited)**	Nov. 2023
Signatures of AGN Feedback: The Post-SOFIA Era **(Invited)**	Oct. 2022
240th Meeting of the AAS	June 2022
2022 Intermediate-Mass Black Holes	April 2022
2020 Aspen Galaxy Quenching Conference	Feb. 2020
235th Meeting of the AAS	Jan. 2020
2019 Santa Cruz Galaxy Workshop	Aug. 2019
Big Apple Magnetic Fields 2019	Jan. 2019
233rd Meeting of the AAS	Jan. 2019
Galaxy Formation & Evolution in Southern California 2018 (GalFRESCA18)	Aug. 2018
2018 Santa Cruz Galaxy Workshop	Aug. 2018
SnowCluster 2018	Mar. 2018
Third LeCosPA International Symposium **(Invited)**	Dec. 2017
Swinburne-Caltech Science Workshop 3 (SCTW3)	Sep. 2017
Galaxy Formation & Evolution in Southern California 2017 (GalFRESCA17)	Aug. 2017
Modeling and Observing DEnse STellar Systems 2017 (MODEST-16)	Sep. 2016
Theoretical Astrophysics in Southern California 2015 (TASC2015)	Nov. 2015

Seminars

CfA, Harvard	HEAD Seminar **(Invited)**	Apr. 2026
University of Notre Dame	Astrophysics Seminar **(Invited)**	Apr. 2026
ASIAA	Special Seminar **(Invited)**	Dec. 2024
ASIAA	Colloquium **(Invited)**	Dec. 2023
UConn	Special Seminar **(Invited)**	Oct. 2023
OSU	CCAPP Seminar	Nov. 2022
CCA	Lunch Talk	Apr. 2021
Columbia	Pizza Lunch	Oct. 2020
CCA	Lunch Talk	Oct. 2019
ASIAA	Lunch Talk **(Invited)**	Dec. 2018
UT Austin	Theory Seminar	Dec. 2018
U Chicago	Prof. Kravtsov and Gnedin Group Meeting	Nov. 2018
UIUC	Astrophysics, Gravitation, and Cosmology Seminar	Oct. 2018
Northwestern	CIERA Theory Group Meeting	Oct. 2018
UCSB	Lunch Talks	Oct. 2018
UCSD	Journal Club Talks	Oct. 2018

UCSC	FLASH seminar	Oct. 2018
Stanford	Cosmology Seminar	Oct. 2018
Princeton	SFIR: Star Formation/ISM Rendezvous	Apr. 2018
Princeton	Galread	Apr. 2018
MIT	Brown Bag Lunch Series	Apr. 2018
Harvard	Hernquist Group Meeting	Mar. 2018
Harvard	Galaxy & Cosmology Seminars	Mar. 2018
Columbia	Thursday Seminar	Mar. 2018
CCA	Internal Talks	Mar. 2018