XUEJIAN(JACOB) SHEN

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Massachusetts Institute of Technology
77 Massachusetts Ave, Cambridge, MA 02139, USA

EDUCATION

California Institute of Technology Sept 2018 - June 2023
Ph.D., Physics; Advisor: Prof. Philip Hopkins
Thesis: Cosmic structure and galaxy formation in alternative dark matter

Peking University Sept 2014 - June 2018
B.S., Physics

EMPLOYMENT

Postdoctoral Researcher Oct 2023 - present
Kavli Institute for Astrophysics and Space Research
Massachusetts Institute of Technology

SubMIT Project Team Oct 2023 - present
Department of Physics, Massachusetts Institute of Technology

Graduate Teaching & Research Assistant Jan 2019 - June 2023
California Institute of Technology

RESEARCH INTERESTS

Cosmological simulations of galaxy formation; The nature of dark matter; Formation and evolution of galaxies and supermassive black holes at high redshift
UAT Keywords: galaxy formation (595) – galaxy evolution (594) – dark matter (353)

SUMMARY OF PUBLICATIONS

Total publications: **63** (45 refereed)
First-author publications: **13**; From supervised students: **9**
Metrics: **>2300 citations**, **>800 first-author citations**, **h-index: 28**
(see attached publication list for details)

AWARDS & FELLOWSHIPS

Neil Gehrels Prize Fellowship (declined) University of Maryland 2023
KIPAC Fellowship (declined) Stanford University, 2023
TCCAP Fellowship (declined) University of Texas at Austin, 2023
James A. Cullen Memorial Fellowship Caltech, 2022
Honored Graduate Peking University, 2018
Robin Li Fellowship Peking University, 2017
Meritorious Award Mathematical Contest in Modeling, 2017
HaiLiang Fellowship Peking University, 2016
GuangHua Fellowship Peking University, 2015

RESEARCH GRANTS

As Principal Investigator (PI)		
JWST-AR-Cycle3 Theory (04814)	$329597.05	10/2024 – 10/2026
As Co-Investigator		
JWST-GO-Cycle4 (07404, PI Naidu)	49.3 hours	10/2025 – 10/2027
SuperMUC-NG at LRZ (PI Puchwein)	33M core hours	09/2025 – 09/2027

TEACHING & ADVISING

Caltech Graduate Teaching Assistant, Computational Physics Lab Ph20/21/22
Lectures, MIT Physics 8.902 (2023,2024)

Undergraduate & Master Students:
Gabriel Aguiar (Caltech, 2021-2022), Eitan Rapaport (Caltech, 2022-2023), Evan Erickson (MIT, 2023-), Yongao Hu (MIT, 2024), Hui Wang (MIT, 2023-2024), Vinh Tran (MIT, 2023-), Aidan Leonard (MIT, 2023-2024), Zihao Wang (NJU & MIT, 2023-), Charline Shen (Harvard, 2023-), Qiaorong Yu (Oxford, 2025), Xiaoqing Sun (MIT, 2024)

SYNERGISTIC ACTIVITIES

Professional Services
- Journal Referee for Monthly Notices of the Royal Astronomical Society (MNRAS, since 2020), MNRAS Letters (since 2023), The Astrophysical Journal (ApJ, since 2022), ApJ Letters (since 2022), Scientific Reports (Since 2023), Physics Review Letters (PRL, since 2024), Physics Review D (PRD, since 2023)
- Oscii Bascii (& Grad student representative) of Theoretical AstroPhysics Including Relativity and Cosmology (TAPIR, 2019-2022), Caltech
- Local Organizing Committee (LOC) for the Galaxy Formation and Evolution in Southern California (GalFRESCA) workshop (2022)
- MIT Physics Basic Computing Services "SubMIT" Project Team Member (since 2023)
- Organizer for MIT Physics Basic Computing Services User Meetings (since 2023)

Outreach
- Speaker at Caltech Stargazing Lecture Series (2023)
- Organizer of Stargazing and Outreach Activities (2015-2018), Peking University

SELECTED TALKS

Invited Talks

- Cosmic Dawn as a portal to New Physics	Boston University, 10/2025
- Cosmic Dawn as a portal to New Physics	Nanjing University, 09/2025
- Cosmic Dawn as a portal to New Physics	Peking University, 09/2025
- Cosmic Dawn as a portal to New Physics	Tsinghua University, 09/2025
- Alternative dark matter in the THESAN simulations	DREAMS collaboration meeting, CCA, 05/2025
- Challenges to galaxy formation models at the cosmic frontier	Yale University, 04/2025
- Challenges to galaxy formation models at the cosmic frontier	CCA, Flatiron Institute, 10/2024
- Challenges to galaxy formation models at the cosmic frontier	Zhejiang University, 09/2024

- Challenges to galaxy formation models at the cosmic frontier — Univ. of Texas Austin, 08/2024
- Challenges to galaxy formation models at the cosmic frontier — Univ. of Cambridge, 06/2024
- The implication of UV variability for the bright galaxy abundance at cosmic dawn — Tsinghua University, 09/2023
- The implication of UV variability for the bright galaxy abundance at cosmic dawn — KIAA seminar, Peking Univ., 09/2023
- Dark Matter: Elusive fibers of the Universe — Stargazing Lecture, Caltech, 05/2023
- New aspects about dark matter models beyond CDM — KIPAC tea talk, Stanford, 02/2023
- Alternative dark matter and structure formation — Obs. Cosmo. seminar, Caltech, 11/2021

Contributed Talks

- Cosmic Dawn as a portal to New Physics — FOLIAGE meeting, 11/2025
- Quasar luminosity functions and clustering in THESAN-XL — Thesan workshop, Harvard CfA, 08/2025
- The rich astrophysical phenomenology in a dissipative dark sector — SIDM workshop, Valencia, 06/2025
- Flash talk: Supermassive black hole seeds from dark matter — CFC meeting, Austin, 05/2025
- Basic Computing Service Review: OpenMPI and Data Transfer — MIT, 05/2025
- First results from the THESAN-ZOOM simulations — Journal Club, MIT, 03/2025
- Star-formation efficiencies in high-redshift galaxies learned from THESAN-ZOOM — Harvard CfA, 03/2025
- Early dark energy as a unified solution to the Hubble tension and early galaxy puzzles raised by JWST — KITP conference, 08/2024
- Insights on efficiency and variability of star-formation from radiation-hydro simulations — Santa Cruz Galaxy Formation Workshop, 08/2024
- Basic Computing Service Review: Custmizations and Community Engagement — MIT, 08/2024
- Challenges to galaxy formation models at the cosmic frontier — Journal Club, MIT, 04/2024
- Challenges to galaxy formation models at high redshifts — University of Vienna, 02/2024 "Building Galaxies from Scratch"
- Galaxy sizes during the epoch of reionization — Harvard CfA, 02/2024
- The implication of UV variability for the bright galaxy abundance at cosmic dawn — ITC luncheon, Harvard CfA, 10/2023
- Galaxy in the epoch of reionization in alternative dark matter — UCLA DM meeting, 03/2023
- Alternative dark matter in galaxy formation — Dark Cosmos seminar, Princeton, 10/2022
- Alternative dark matter in galaxy formation — Brown Bag lunch talk, MIT, 10/2022
- Alternative dark matter in galaxy formation — Harvard CfA, 10/2022
- Alternative dark matter in galaxy formation — FIRE seminar, 10/2022
- Dwarf galaxies in dissipative dark matter — GalFRESCA workshop, 09/2022
- High-redshift predictions from the Illustris-TNG simulations — MIT, 08/2019
- High-redshift predictions from the Illustris-TNG simulations — Caltech, 06/2019

SELECTED PRESS COVERAGE

Kavli Foundation News: "Early" Dark Energy Could Explain Anomalous Galaxies and the Universe's Disjointed Expansion Rate
Univ. of Cambridge News: Dark energy in the early universe could solve two major problems in cosmology
UT Austin News: Early Dark Energy Could Resolve Cosmology's Two Biggest Puzzles
Yahoo News: How dark energy could relieve 'Hubble tension' and galaxy headaches
Phys.org: Early dark energy could resolve cosmology's two biggest puzzles
MirageNews: Early Dark Energy May Solve Cosmology's Top Two Mysteries
MIT News: Early dark energy could resolve cosmology's two biggest puzzles
CCA News: Bursts of Star Formation Explain Mysterious Brightness at Cosmic Dawn
Space.com: Dark matter atoms may form shadowy galaxies with rapid star formation
Northwestern News: Bursts of star formation explain mysterious brightness at cosmic dawn
Phys.org: Dark matter can make dark atoms, say theoretical astrophysicists
Scientific American: JWST's Glimpses of Early Galaxies Could Shed Light on Dark Matter
Astrobites: Forecasting the obscured first few billion years

PUBLICATIONS (FIRST-AUTHOR & PEER-REVIEWED)

See my NASA ADS bibliography for full information (ORCID **0000-0002-6196-823X**)

1. **Xuejian Shen**, Mark Vogelsberger, Josh Borrow, Yongao Hu, Evan Erickson, Rahul Kannan, Aaron Smith, Enrico Garaldi, Lars Hernquist, Takahiro Morishita, Sandro Tacchella, Oliver Zier, Guochao Sun, Anna-Christina Eilers, and Hui Wang. The THESAN project: galaxy sizes during the epoch of reionization. *MNRAS*, 534(2):1433–1458, October 2024

2. **Xuejian Shen**, Mark Vogelsberger, Michael Boylan-Kolchin, Sandro Tacchella, and Rohan P. Naidu. Early galaxies and early dark energy: a unified solution to the hubble tension and puzzles of massive bright galaxies revealed by JWST. *MNRAS*, 533(4):3923–3936, October 2024

3. **Xuejian Shen**, Philip F. Hopkins, Lina Necib, Fangzhou Jiang, Michael Boylan-Kolchin, and Andrew Wetzel. Dissipative Dark Matter on FIRE. II. Observational Signatures and Constraints from Local Dwarf Galaxies. *ApJ*, 966(1):131, May 2024

4. **Xuejian Shen**, Huangyu Xiao, Philip F. Hopkins, and Kathryn M. Zurek. Disruption of Dark Matter Minihalos in the Milky Way Environment: Implications for Axion Miniclusters and Early Matter Domination. *ApJ*, 962(1):9, February 2024

5. **Xuejian Shen**, Josh Borrow, Mark Vogelsberger, Enrico Garaldi, Aaron Smith, Rahul Kannan, Sandro Tacchella, Jesús Zavala, Lars Hernquist, Jessica Y. C. Yeh, and Chunyuan Zheng. THESAN-HR: galaxies in the Epoch of Reionization in warm dark matter, fuzzy dark matter, and interacting dark matter. *MNRAS*, 527(2):2835–2857, January 2024

6. **Xuejian Shen**, Mark Vogelsberger, Michael Boylan-Kolchin, Sandro Tacchella, and Rahul Kannan. The impact of UV variability on the abundance of bright galaxies at $z \geq 9$. *MNRAS*, 525(3):3254–3261, November 2023

7. **Xuejian Shen**, Thejs Brinckmann, David Rapetti, Mark Vogelsberger, Adam Mantz, Jesús Zavala, and Steven W. Allen. X-ray morphology of cluster-mass haloes in self-interacting dark matter. *MNRAS*, 516(1):1302–1319, October 2022

8. **Xuejian Shen**, Mark Vogelsberger, Dylan Nelson, Sandro Tacchella, Lars Hernquist, Volker Springel, Federico Marinacci, and Paul Torrey. High-redshift predictions from IllustrisTNG - III. Infrared luminosity functions, obscured star formation, and dust temperature of high-redshift galaxies. *MNRAS*, 510(4):5560–5578, March 2022

9. **Xuejian Shen**, Philip F. Hopkins, Lina Necib, Fangzhou Jiang, Michael Boylan-Kolchin, and Andrew Wetzel. Dissipative dark matter on FIRE - I. Structural and kinematic properties of dwarf galaxies. *MNRAS*, 506(3):4421–4445, September 2021

10. **Xuejian Shen**, Mark Vogelsberger, Dylan Nelson, Annalisa Pillepich, Sandro Tacchella, Federico Marinacci, Paul Torrey, Lars Hernquist, and Volker Springel. High-redshift JWST predictions from IllustrisTNG: II. Galaxy line and continuum spectral indices and dust attenuation curves. *MNRAS*, 495(4):4747–4768, July 2020

11. **Xuejian Shen**, Philip F. Hopkins, Claude-André Faucher-Giguère, D. M. Alexander, Gordon T. Richards, Nicholas P. Ross, and R. C. Hickox. The bolometric quasar luminosity function at z = 0-7. *MNRAS*, 495(3):3252–3275, January 2020

PUBLICATIONS (FIRST-AUTHOR & UNDER REVIEW)

1. **Xuejian Shen**, Rahul Kannan, Ewald Puchwein, Aaron Smith, Mark Vogelsberger, Josh Borrow, Enrico Garaldi, Laura Keating, Oliver Zier, William McClymont, Sandro Tacchella, Zihao Wang, and Lars Hernquist. The THESAN-ZOOM project: Star-formation efficiencies in high-redshift galaxies. *arXiv e-prints*, page arXiv:2503.01949, March 2025

2. **Xuejian Shen**, Oliver Zier, Mark Vogelsberger, Michael Boylan-Kolchin, Lars Hernquist, Sandro Tacchella, and Rohan P. Naidu. The Cosmic Rush Hour: Rapid Formation of Bright, Massive, Disky, Star-Forming Galaxies as Signatures of Early-Universe Physics. *arXiv e-prints*, page arXiv:2509.19427, September 2025

PUBLICATIONS (CO-AUTHORED & PEER-REVIEWED)

* indicate publications with core contributions
† indicate publications from supervised students

1. * † Vinh Tran, **Xuejian Shen**, Daniel Gilman, Mark Vogelsberger, Stephanie O'Neil, Donghua Xiong, Jiayi Hu, and Ziang Wu. Core collapse in resonant self-interacting dark matter across two decades in halo mass. *Phys. Rev. D*, 112(8):083003, October 2025

2. * Xiaoqing Sun, Stephanie O'Neil, **Xuejian Shen**, and Mark Vogelsberger. The effects of projection on measuring the splashback feature. *The Open Journal of Astrophysics*, 8:100, July 2025

3. * † Sandip Roy, **Xuejian Shen**, Jared Barron, Mariangela Lisanti, David Curtin, Norman Murray, and Philip F. Hopkins. Aggressively Dissipative Dark Dwarfs: The Effects of Atomic Dark Matter on the Inner Densities of Isolated Dwarf Galaxies. *ApJ*, 982(2):175, April 2025

4. * Vinh Tran, Daniel Gilman, Mark Vogelsberger, **Xuejian Shen**, Stephanie O'Neil, and Xinyue Zhang. Gravothermal catastrophe in resonant self-interacting dark matter models. *Phys. Rev. D*, 110(4):043048, August 2024

5. * † Aidan Leonard, Stephanie O'Neil, **Xuejian Shen**, Mark Vogelsberger, Olivia Rosenstein, Haotian Shangguan, Yuanhong Teng, and Jiayi Hu. Varying primordial state fractions in exo- and endothermic SIDM simulations of Milky Way-mass haloes. *MNRAS*, 531(1):1440–1453, June 2024

6. * † Caleb Gemmell, Sandip Roy, **Xuejian Shen**, David Curtin, Mariangela Lisanti, Norman Murray, and Philip F. Hopkins. Dissipative Dark Substructure: The Consequences of Atomic Dark Matter on Milky Way Analog Subhalos. *ApJ*, 967(1):21, May 2024

7. * Philip F. Hopkins, Alexander B. Gurvich, **Xuejian Shen**, Zachary Hafen, Michael Y. Grudić, Shalini Kurinchi-Vendhan, Christopher C. Hayward, Fangzhou Jiang, Matthew E. Orr, Andrew Wetzel, Dušan Kereš, Jonathan Stern, Claude-André Faucher-Giguère, James Bullock, Coral Wheeler, Kareem El-Badry, Sarah R. Loebman, Jorge Moreno, Michael Boylan-Kolchin, and Eliot Quataert. What causes the formation of discs and end of bursty star formation? *MNRAS*, 525(2):2241–2286, October 2023

8. * Guochao Sun, Claude-André Faucher-Giguère, Christopher C. Hayward, **Xuejian Shen**, Andrew Wetzel, and Rachel K. Cochrane. Bursty Star Formation Naturally Explains the Abundance of Bright Galaxies at Cosmic Dawn. *ApJ*, 955(2):L35, October 2023

9. * † Sandip Roy, **Xuejian Shen**, Mariangela Lisanti, David Curtin, Norman Murray, and Philip F. Hopkins. Simulating Atomic Dark Matter in Milky Way Analogs. *ApJ*, 954(2):L40, September 2023

10. * Rahul Kannan, Aaron Smith, Enrico Garaldi, **Xuejian Shen**, Mark Vogelsberger, Rüdiger Pakmor, Volker Springel, and Lars Hernquist. The THESAN project: predictions for multitracer line intensity mapping in the epoch of reionization. *MNRAS*, 514(3):3857–3878, August 2022

11. * Huangyu Xiao, **Xuejian Shen**, Philip F. Hopkins, and Kathryn M. Zurek. SMBH seeds from dissipative dark matter. *J. Cosmol. Astropart. Phys.*, 2021(7):039, July 2021

12. * Mark Vogelsberger, Dylan Nelson, Annalisa Pillepich, **Xuejian Shen**, Federico Marinacci, Volker Springel, Rüdiger Pakmor, Sandro Tacchella, Rainer Weinberger, Paul Torrey, and Lars Hernquist. High-redshift JWST predictions from IllustrisTNG: dust modelling and galaxy luminosity functions. *MNRAS*, 492(4):5167–5201, March 2020

13. * Philip Mocz, Anastasia Fialkov, Mark Vogelsberger, Fernando Becerra, **Xuejian Shen**, Victor H. Robles, Mustafa A. Amin, Jesús Zavala, Michael Boylan-Kolchin, Sownak Bose, Federico Marinacci, Pierre-Henri Chavanis, Lachlan Lancaster, and Lars Hernquist. Galaxy formation with BECDM - II. Cosmic filaments and first galaxies. *MNRAS*, 494(2):2027–2044, May 2020

14. * Mark R. Lovell, Jesús Zavala, Mark Vogelsberger, **Xuejian Shen**, Francis-Yan Cyr-Racine, Christoph Pfrommer, Kris Sigurdson, Michael Boylan-Kolchin, and Annalisa Pillepich. ETHOS - an effective theory of structure formation: predictions for the high-redshift Universe - abundance of galaxies and reionization. *MNRAS*, 477(3):2886–2899, July 2018

15. * Yunchong Wang, Mark Vogelsberger, Dandan Xu, **Xuejian Shen**, Shude Mao, David Barnes, Hui Li, Federico Marinacci, Paul Torrey, Volker Springel, and Lars Hernquist. Early-type galaxy density profiles from IllustrisTNG - II. Evolutionary trend of the total density profile. *MNRAS*, 490(4):5722–5738, October 2019

16. William McClymont, Sandro Tacchella, Aaron Smith, Rahul Kannan, Ewald Puchwein, Josh Borrow, Enrico Garaldi, Laura Keating, Mark Vogelsberger, Oliver Zier, **Xuejian Shen**, and Filip Popovic. The THESAN-ZOOM project: central starbursts and inside-out quenching govern galaxy sizes in the early Universe. *MNRAS*, October 2025

17. William McClymont, Sandro Tacchella, Aaron Smith, Rahul Kannan, Ewald Puchwein, Josh Borrow, Enrico Garaldi, Laura Keating, Mark Vogelsberger, Oliver Zier, **Xuejian Shen**, Filip Popovic, and Charlotte Simmonds. The THESAN-ZOOM project: burst, quench, repeat – unveiling the evolution of high-redshift galaxies along the star-forming main sequence. *MNRAS*, 544(1):513–534, November 2025

18. Oliver Zier, Rahul Kannan, Aaron Smith, Ewald Puchwein, Mark Vogelsberger, Josh Borrow, Enrico Garaldi, Laura Keating, William McClymont, **Xuejian Shen**, and Lars Hernquist. The THESAN-ZOOM project: Population III star formation continues until the end of reionization. *MNRAS*, 544(1):410–429, November 2025

19. Oliver Zier, Rahul Kannan, Aaron Smith, Ewald Puchwein, Mark Vogelsberger, Josh Borrow, Enrico Garaldi, Laura Keating, William McClymont, **Xuejian Shen**, and Lars Hernquist. The THESAN–ZOOM project: long-term imprints of external reionization on galaxy evolution. *MNRAS*, 544(1):391–409, November 2025

20. Rahul Kannan, Ewald Puchwein, Aaron Smith, Josh Borrow, Enrico Garaldi, Laura Keating, Mark Vogelsberger, Oliver Zier, William McClymont, **Xuejian Shen**, Filip Popovic, Sandro Tacchella, Lars Hernquist, and Volker Springel. Introducing the THESAN-ZOOM project: radiation-hydrodynamic simulations of high-redshift galaxies with a multi-phase interstellar medium. *The Open Journal of Astrophysics*, 8:153, October 2025

21. Teodora-Elena Bulichi, Oliver Zier, Aaron Smith, Mark Vogelsberger, Anna-Christina Eilers, Rahul Kannan, **Xuejian Shen**, Ewald Puchwein, Enrico Garaldi, and Josh Borrow. High-redshift AGN population in radiation-hydrodynamics simulations. *MNRAS*, 544(1):355–371, November 2025

22. Maria C. Straight, Michael Boylan-Kolchin, James S. Bullock, Philip F. Hopkins, **Xuejian Shen**, Lina Necib, Alexandres Lazar, Andrew S. Graus, and Jenna Samuel. Central densities of dark matter haloes in FIRE-2 simulations of low-mass galaxies with cold dark matter and self-interacting dark matter. *MNRAS*, 543(3):1995–2005, November 2025

23. Nathan Jamieson, Aaron Smith, Meredith Neyer, Rahul Kannan, Enrico Garaldi, Mark Vogelsberger, Lars Hernquist, Oliver Zier, **Xuejian Shen**, and Koki Kakiichi. The THESAN project: tracking the expansion and merger histories of ionized bubbles during the Epoch of Reionization. *MNRAS*, 541(2):1088–1105, August 2025

24. Desika Narayanan, Daniel P. Stark, Steven L. Finkelstein, Paul Torrey, Qi Li, Fergus Cullen, Micheal W. Topping, Federico Marinacci, Laura V. Sales, **Xuejian Shen**, and Mark Vogelsberger. The Ultraviolet Slopes of Early Universe Galaxies: The Impact of Bursty Star Formation, Dust, and Nebular Continuum Emission. *ApJ*, 982(1):7, March 2025

25. Robert Feldmann, Michael Boylan-Kolchin, James S. Bullock, Onur Çatmabacak, Claude-André Faucher-Giguère, Christopher C. Hayward, Dušan Kereš, Alexandres Lazar, Lichen Liang, Jorge Moreno, Pascal A. Oesch, Eliot Quataert, **Xuejian Shen**, and Guochao Sun.

Elevated UV luminosity density at Cosmic Dawn explained by non-evolving, weakly mass-dependent star formation efficiency. *MNRAS*, 536(1):988–1016, January 2025

26. Cian Roche, Michael McDonald, Josh Borrow, Mark Vogelsberger, **Xuejian Shen**, Volker Springel, Lars Hernquist, Ruediger Pakmor, Sownak Bose, and Rahul Kannan. Brightest Cluster Galaxy Offsets in Cold Dark Matter. *The Open Journal of Astrophysics*, 7:65, August 2024

27. Enrico Garaldi, Rahul Kannan, Aaron Smith, Josh Borrow, Mark Vogelsberger, Rüdiger Pakmor, Volker Springel, Lars Hernquist, Daniela Galárraga-Espinosa, Jessica Y. C. Yeh, **Xuejian Shen**, Clara Xu, Meredith Neyer, Benedetta Spina, Mouza Almualla, and Yu Zhao. The THESAN project: public data release of radiation-hydrodynamic simulations matching reionization-era JWST observations. *MNRAS*, 530(4):3765–3786, June 2024

28. Takahiro Morishita, Massimo Stiavelli, Ranga-Ram Chary, Michele Trenti, Pietro Bergamini, Marco Chiaberge, Nicha Leethochawalit, Guido Roberts-Borsani, **Xuejian Shen**, and Tommaso Treu. Enhanced Subkiloparsec-scale Star Formation: Results from a JWST Size Analysis of 341 Galaxies at z = 5 - 14. *ApJ*, 963(1):9, March 2024

29. Thomas K. Waters, Colton Peterson, Razieh Emami, **Xuejian Shen**, Lars Hernquist, Randall Smith, Mark Vogelsberger, Charles Alcock, Grant Tremblay, Matthew Liska, John C. Forbes, and Jorge Moreno. Gas Morphology of Milky Way–like Galaxies in the TNG50 Simulation: Signals of Twisting and Stretching. *ApJ*, 961(2):193, February 2024

30. Guochao Sun, Claude-André Faucher-Giguère, Christopher C. Hayward, and **Xuejian Shen**. Seen and unseen: bursty star formation and its implications for observations of high-redshift galaxies with JWST. *MNRAS*, 526(2):2665–2672, December 2023

31. Philip F. Hopkins, Ethan O. Nadler, Michael Y. Grudić, **Xuejian Shen**, Isabel Sands, and Fangzhou Jiang. Novel conservative methods for adaptive force softening in collisionless and multispecies N-body simulations. *MNRAS*, 525(4):5951–5977, November 2023

32. Fangzhou Jiang, Andrew Benson, Philip F. Hopkins, Oren Slone, Mariangela Lisanti, Manoj Kaplinghat, Annika H. G. Peter, Zhichao Carton Zeng, Xiaolong Du, Shengqi Yang, and **Xuejian Shen**. A semi-analytic study of self-interacting dark-matter haloes with baryons. *MNRAS*, 521(3):4630–4644, May 2023

33. Razieh Emami, Lars Hernquist, Mark Vogelsberger, **Xuejian Shen**, Joshua S. Speagle, Jorge Moreno, Charles Alcock, Shy Genel, John C. Forbes, Federico Marinacci, and Paul Torrey. On the Robustness of the Velocity Anisotropy Parameter in Probing the Stellar Kinematics in Milky Way-Like Galaxies: Takeaway from TNG50 Simulation. *ApJ*, 937(1):20, September 2022

34. Razieh Emami, Lars Hernquist, Charles Alcock, Shy Genel, Sownak Bose, Rainer Weinberger, Mark Vogelsberger, **Xuejian Shen**, Joshua S. Speagle, Federico Marinacci, John C. Forbes, and Paul Torrey. Inferring the Morphology of Stellar Distribution in TNG50: Twisted and Twisted-stretched Shapes. *ApJ*, 918(1):7, September 2021

PUBLICATIONS (CO-AUTHORED & UNDER REVIEW)

1. * † Zihao Wang, **Xuejian Shen**, Mark Vogelsberger, Hui Li, Rahul Kannan, Ewald Puchwein, Aaron Smith, Josh Borrow, Enrico Garaldi, Laura Keating, Oliver Zier, William Mc-

Clymont, Sandro Tacchella, Yang Ni, and Lars Hernquist. The THESAN-ZOOM project: Star formation efficiency from giant molecular clouds to galactic scale in high-redshift starbursts. *arXiv e-prints*, page arXiv:2505.05554, May 2025

2. * † Tingwei Shen, **Xuejian Shen**, Huangyu Xiao, Mark Vogelsberger, and Fangzhou Jiang. Massive Black Holes Seeded by Dark Matter – Implications for Little Red Dots and Gravitational Wave Signatures. *arXiv e-prints*, page arXiv:2504.00075, March 2025

3. * † Vinh Tran, **Xuejian Shen**, Mark Vogelsberger, Daniel Gilman, Stephanie O'Neil, and Jiarun Gao. A Novel Density Profile for Isothermal Cores of Dark Matter Halos. *arXiv e-prints*, page arXiv:2411.11945, November 2024

4. * † Qiaorong S. Yu, Stephanie O'Neil, **Xuejian Shen**, Mark Vogelsberger, Sownak Bose, Boryana Hadzhyska, Lars Hernquist, Rahul Kannan, Monica Wu, and Ziang Wu. Measuring the splashback feature: Dependence on halo properties and history. *arXiv e-prints*, page arXiv:2507.22102, July 2025

5. * Alex M. Garcia, Paul Torrey, Aniket Bhagwat, **Xuejian Shen**, Mark Vogelsberger, William McClymont, Jaya Nagarajan-Swenson, Sophia G. Ridolfo, Peixin Zhu, Dhruv T. Zimmerman, Oliver Zier, Sarah Biddle, Arnab Sarkar, Priyanka Chakraborty, Ruby J. Wright, Kathryn Grasha, Tiago Costa, Laura Keating, Rahul Kannan, Aaron Smith, Enrico Garaldi, Ewald Puchwein, Benedetta Ciardi, Lars Hernquist, and Lisa J. Kewley. Metallicity Gradients in Modern Cosmological Simulations II: The Role of Bursty Versus Smooth Feedback at High-Redshift. *arXiv e-prints*, page arXiv:2510.26877, October 2025

6. * Aimee L. Schechter, Aleksandra Ćiprijanović, **Xuejian Shen**, Rebecca Nevin, Julia M. Comerford, Aaron Stemo, Laura Blecha, and Austin Fraley. Beyond the Brightest: A Deep Learning Approach to Identifying Major and Minor Galaxy Mergers in CANDELS at $z \sim 1$. *arXiv e-prints*, page arXiv:2510.12173, October 2025

7. Giulia Pruto, Laura Keating, Rahul Kannan, Ewald Puchwein, Aaron Smith, Josh Borrow, Enrico Garaldi, Mark Vogelsberger, Oliver Zier, William McClymont, **Xuejian Shen**, and Sandro Tacchella. The THESAN-ZOOM project: The Hidden Neighbours of OI Absorbers during Reionization. *arXiv e-prints*, page arXiv:2510.13977, October 2025

8. Belén Costanza, Bonny Y. Wang, Francisco Villaescusa-Navarro, Alex M. Garcia, Jonah C. Rose, Mark Vogelsberger, Paul Torrey, Arya Farahi, **Xuejian Shen**, and Ilem Leisher. On the sensitivity of different galaxy properties to warm dark matter. *arXiv e-prints*, page arXiv:2510.05037, October 2025

9. William McClymont, Sandro Tacchella, Aaron Smith, Rahul Kannan, Enrico Garaldi, Ewald Puchwein, Yuki Isobe, Xihan Ji, **Xuejian Shen**, Zihao Wang, Vasily Belokurov, Josh Borrow, Francesco D'Eugenio, Laura Keating, Roberto Maiolino, Stephanie Monty, Mark Vogelsberger, and Oliver Zier. The THESAN-ZOOM project: Mystery N/O more – uncovering the origin of peculiar chemical abundances and a not-so-fundamental metallicity relation at 3¡z¡12. *arXiv e-prints*, page arXiv:2507.08787, July 2025

10. William McClymont, Sandro Tacchella, Xihan Ji, Rahul Kannan, Roberto Maiolino, Charlotte Simmonds, Aaron Smith, Ewald Puchwein, Enrico Garaldi, Mark Vogelsberger, Francesco D'Eugenio, Laura Keating, **Xuejian Shen**, Bartolomeo Trefoloni, and Oliver Zier. Overmassive black holes in the early Universe can be explained by gas-rich, dark matter-dominated galaxies. *arXiv e-prints*, page arXiv:2506.13852, June 2025

11. Josh Bendavid, Mariarosaria D'Alfonso, Jan Eysermans, Chad Freer, Maxim Goncharov, Matthew Heine, Luca Lavezzo, Marianne Moore, Christoph Paus, **Xuejian Shen**, David Walter, and Zhangqier Wang. SubMIT: A Physics Analysis Facility at MIT. *arXiv e-prints*, page arXiv:2506.01958, May 2025

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