XUEJIAN(JACOB) SHEN

(+1)617-866-3133 ⋄ xshen@caltech.edu ⋄ Personal Website
California Institute of Technology
1200 E. California Blvd, Pasadena, CA 91125 USA

EDUCATION

California Institute of Technology *Sept 2018 - Present*
Ph.D. Candidate, Physics
Division of Physics, Math and Astronomy, California Institute of Technology, Pasadena, CA, USA
Academic and Research Advisor: Prof. Philip Hopkins
Thesis Title: Cosmic structure and galaxy formation in alternative dark matter

Peking University *Sept 2014 - June 2018*
B.S., Physics
Department of Physics, Peking University, Beijing, China
Advisor: Prof. Fukun Liu
Thesis Title: "Strengthened Kozai-Lidov Oscillation, Tidal Disruption Event Rate and Gravitational Wave in Hierarchical SMBH Triplets"

EMPLOYMENT

Graduate Research Assistant July 2022 - Present
California Institute of Technology, Pasadena, CA, USA

Graduate Teaching Assistant Jan 2018 - June 2022
California Institute of Technology, Pasadena, CA, USA

Undergraduate Summer Research Internship July 2017 - Sept 2017
Kavli Institute for Astrophysics and Space Research, Massachusetts Institute of Technology, Cambridge, MA, USA

RESEARCH INTERESTS

Cosmological simulations of galaxy formation; Astrophysical constraints of the nature of dark matter; Galaxies and quasars at high redshift

RESEARCH INDICES AND METRICS

Total refereed publications: 11 Total citations: 366 Total number of reads: 6328
h-index: 9 i10-index: 9
Full publication list (ADS)

TECHNICAL STRENGTHS

Natural Languages	Native in Mandarin. Fluent in English.
Programming Languages	Proficient in Python, Mathematica, C and Linux shell. Experience in C++, MATLAB, SQL.
Markup Languages	Proficient in LaTeX and HTML.
License and Certificate	Introduction to Financial Engineering and Risk Management (Coursera) Issued Jun 2022, Credential ID 8K3YWRDRVZU5 Term-Structure and Credit Derivatives (Coursera) Issued August 2022, Credential ID K2QCSYGZ24L6

TEACHING & ADVISING

Caltech Graduate Teaching Assistant	Compulational Physics Lab Ph20/21/22 (2019 - 2022)
Caltech SURF program 2021	Co-advisor of Gabriel Aguiar
Caltech SURF program 2022	Co-advisor of Eitan Rapaport

AWARDS

James A. Cullen Memorial Fellowship 2022
Caltech, The Division of Physics, Mathematics and Astronomy

Honored Graduate 2018
Peking University

Robin Li Fellowship 2017
Peking University

Meritorious Award 2017
Mathematical Contest in Modeling (MCM)

Silver Medal 2013
National Final of the 30th Chinese Physics Olympiad (CPHO)

PUBLICATIONS (FIRST-AUTHOR/MAJOR CONTRIBUTION)

1. Vogelsberger, Mark; Nelson, Dylan; Pillepich, Annalisa; Shen, Xuejian et al. (2020), **High redshift JWST predictions from IllustrisTNG: Dust modelling and galaxy luminosity functions**, Monthly Notices of the Royal Astronomical Society 492 (4), 5167-5201

2. Shen, Xuejian; Hopkins, Philip; Faucher-Giguère, Claude-André; Alexander, Dave; Richards, Gordon; Ross, Nicholas; Hickox, Ryan (2020), **The Bolometric Quasar Luminosity Function at z = 0 − 7**, Monthly Notices of the Royal Astronomical Society 495 (3), 3252-3275

3. Shen, Xuejian; Vogelsberger, Mark; Nelson, Dylan; Pillepich, Annalisa et al. (2020), **High redshift JWST predictions from IllustrisTNG: II. Galaxy line and continuum spectral indices and dust attenuation curves**, Monthly Notices of the Royal Astronomical Society 495 (4), 4747-4768

4. Shen, Xuejian; Hopkins, Philip; Necib, Lina et al. (2021), **Dissipative Dark Matter on FIRE: I. Structural and kinematic properties of dwarf galaxies**, Monthly Notices of the Royal Astronomical Society 506 (3), 4421-4445

5. Shen, Xuejian; Vogelsberger, Mark; Nelson, Dylan; Pillepich, Annalisa et al. (2022), **High redshift JWST predictions from IllustrisTNG: III. Infrared luminosity functions, obscured star formation and dust temperature of high-redshift galaxies**, Monthly Notices of the Royal Astronomical Society, Volume 510 (4), 5560-5578

6. Xiao, Huangyu; Shen, Xuejian; Zurek, Kathryn; Hopkins, Philip (2021), **SMBH seeds from dissipative dark matter**, Journal of Cosmology and Astroparticle Physics 2021 (07), 039-43

7. Shen, Xuejian; Hopkins, Philip; Necib, Lina et al. (2022), **Dissipative Dark Matter on FIRE: II. Observational signatures and constraints from local dwarf galaxies** (submitted to MNRAS)

8. Shen, Xuejian; Thejs Brinckmann; David Rapetti et al. (2022), **X-ray morphology of cluster-mass haloes in self-interacting dark matter** (to be published on MNRAS)

9. Shen, Xuejian; Xiao, Huangyu; Hopkins, Philip F.; Zurek, Kathryn M. (2022), **Disruption of Dark Matter Minihaloes in the Milky Way environment: Implications for Axion Miniclusters and Early Matter Domination**, arXiv:2207.11276

PUBLICATIONS (ADVISORY/COLLABORATIVE)

1. Lovell, Mark R.; Zavala, Jesús; Vogelsberger, Mark; Shen, Xuejian; Cyr-Racine, Francis-Yan et al. (2018), **ETHOS – an effective theory of structure formation: predictions for the high-redshift Universe – abundance of galaxies and reionization**, Monthly Notices of the Royal Astronomical Society 477 (3), 2886-2899

2. Wang, Yunchong; Vogelsberger, Mark; Xu, Dandan; Shen, Xuejian et al. (2019), **Early-type galaxy density profiles from IllustrisTNG – II. Evolutionary trend of the total density profile**, Monthly Notices of the Royal Astronomical Society, 490 (4), 5722-5738

3. Mocz, Philip; Fialkov, Anastasia; Vogelsberger, Mark; Becerra, Fernando; Shen, Xuejian et al. (2019), **Galaxy Formation with BECDM – II. Cosmic Filaments and First Galaxies**, Monthly Notices of the Royal Astronomical Society 494 (2), 2027-2044

4. Emami, Razieh; Hernquist, Lars; Alcock, Charles; Genel, Shy et al. (2021), **Inferring the Morphology of Stellar Distribution in TNG50: Twisted and Twisted-stretched Shapes**, The Astrophysical Journal 918 (1), 7-24

5. Kannan, Rahul; Smith, Aaron; Garaldi, Enrico; Shen, Xuejian et al. (2022), **The THESAN project: predictions for multi-tracer line intensity mapping in the Epoch of Reionization**, Monthly Notices of the Royal Astronomical Society, Volume 514, Issue 3, pp.3857-3878

6. Jiang, Fangzhou; Benson, Andrew; Hopkins, Philip F. et al. (2022), **A semi-analytic study of self-interacting dark-matter haloes with baryons**, arXiv:2206.12425

7. Emami, Razieh; Hernquist, Lars; Vogelsberger, Mark; Shen, Xuejian et al. (2022), **On the robustness of the velocity anisotropy parameter in probing the stellar kinematics in Milky Way like galaxies: Take away from TNG50 simulation**, arXiv:2202.07162

TALKS

The bolometric quasar luminosity function	Caltech group meeting (2019.4)
High-z prediction with Illustris-TNG	Caltech group meeting (2019.8)
High-z prediction with Illustris-TNG	MIT Compulational Structure and Galaxy Formation group meeting (2019.11)
Dissipative dark matter on FIRE	Caltech group meeting (2020.4)
Alternative dark matter and structure formation	Invited talk, Observational cosmology seminar Caltech (2021.7)
Axion miniclusters in the Milky Way halo environment	Caltech group meeting (2022.2)
Dissipative dark matter on FIRE: structual and kinematic properties of dwarfs and observational signatures	AAS, the 240th meeting (Pasadena, CA, 2022)
Galaxy formation in dissipative dark matter	GalFRESCA (Pasadena, CA, 2022)

SERVICE TO PROFESSION

Reviewer of journals:
Monthly Notices of the Royal Astronomical Society

The Astrophysical Journal
See my Publons profile for details

Leader of the Local Organizing Committee (LOC) for the Galaxy Formation and Evolution in Southern California (GalFRESCA) workshop (2022)