

# Jean Somalwar

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## Education

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**California Institute of Technology**, PhD Astrophysics (expected Spring 2025) 2020 - Present

- **Thesis:** The rate and diversity of tidal disruption events

- **Advisor:** Vikram Ravi

**Princeton University**, AB Physics

2017 – 2020

- **Senior Thesis:** (*Prof. Jenny Greene*) Globular Clusters in Ultra-Diffuse Galaxies
- **Spring Junior Thesis:** (*Prof. Mariangela Lisanti*) Searching for Annihilating Dark Matter in Galactic Subhalos with Photon Statistics
- **Fall Junior Thesis:** (*Prof. Michael Romalis*) Development of a  $^3\text{He}$ - $^2\text{1Ne}$  Comagnetometer

## Research Interests

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*Novel observational probes of massive black hole formation and evolution*  
*Multiwavelength, time-domain astrophysics*

## Research Positions

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- Graduate Student, California Institute of Technology (2020-)
  - Research Assistant (*Prof. Jenny Greene*) Princeton University (2019-2020)
  - Research Assistant (*Prof. Mariangela Lisanti*) Princeton University (2018-2020)
  - Research Assistant (*Prof. Michael Romalis*) Princeton University (Fall 2018)
  - Research Assistant (*Prof. Eva Halkiadakis*) Rutgers University (2015-2017)

## Observing Experience and Awarded Time

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I have been PI-ed multiple funded proposals from major space telescopes (9 orbits *HST*, 60 ks *NuSTAR*). I have also been the PI on proposals using the Neils Gehrel Swift Telescope, XMM-Newton Telescope, Very Large Array, Australian Telescope Compact Array, and Palomar 200 inch Telescope. I have significant experience preparing and executing observations with all of these facilities, as well as  $\gtrsim 40$  nights on the Keck Telescopes, 3 nights on the Magellan telescopes, and  $\gtrsim 10$  nights on the Palomar 200 inch.

*Hubble Space Telescope:*

- PI (7 orbits, funded): The Most Extreme Globular Cluster Systems in Low Surface Brightness Galaxies
- PI (2 orbits, funded): HST/STIS spectroscopy of AT2020vdq: diagnosing fast outflows in a remarkably energetic partial tidal disruption event
- Co-I on multiple proposals, >60 orbits awarded

*NuSTAR:*

- PI (60 ks Nustar + 9ks Swift telescope; funded): Tidal disruption events in active galactic nuclei

*Neils Gehrel Swift Telescope*

- PI on >60 ks of TOO observations

*XMM-Newton Telescope*

- PI on >60 ks of TOO observations

*Very Large Array*

- PI XX
- Co-I XX

*Australian Telescope Compact Array*

- PI XX
- Co-I XX
- Trained observer, ~30 hours observing experience

#### *Keck Telescope*

- PI XX
- Co-I XX

#### *Palomar Telescope*

- PI XX
- Co-I XX

#### *Magellan Telescope*

- PI XX
- Co-I XX

## Honors and Awards

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- Garmire Scholar (2024)
- National Science Foundation Graduate Research Fellow (2021-2023)
- Caltech Graduate Student Council Mentorship Award (2023)
- 2022 Keck Institute for Space Studies (KISS) Affiliate (Dec 2021)
- Allen G. Shenstone Prizes for Academic and Research Excellence (June 2018, June 2019)
- Bell-Burnell Award (June 2018)

## Teaching

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- TA, introduction to classical mechanics
- TA, graduate radio astronomy

## Advising

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- Dylan Perez (Summer 2024) - lead mentor on XX
- Thuwaragesh Jayachandran (Summer 2024) - SURF program, lead mentor on XX
- Nitya Nigam (Summer 2024) - SURF program, lead mentor on XX
- Matilda Eriksson (Summer 2023) - WAVE program, co-mentored on XX
- Rey Squillace (Summer 2022) - SURF program, co-mentored on XX

## Publications

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### First Author Publications

- [1] Jean J. Somalwar and Vikram Ravi. “The origin of the nano-Hertz stochastic gravitational wave background: the contribution from *zrsim1* supermassive black-hole binaries”. In: *arXiv e-prints*, arXiv:2306.00898 (June 2023), arXiv:2306.00898. DOI: 10.48550/arXiv.2306.00898. arXiv: 2306.00898 [astro-ph.GA].
- [2] Jean J. Somalwar, Vikram Ravi, and Wenbin Lu. “VLASS tidal disruption events with optical flares II: discovery of two TDEs with intermediate width Balmer emission lines and connections to the ambiguous extreme coronal line emitters”. In: *arXiv e-prints*, arXiv:2310.03795 (Oct. 2023), arXiv:2310.03795. DOI: 10.48550/arXiv.2310.03795. arXiv: 2310.03795 [astro-ph.HE].
- [3] Jean J. Somalwar et al. “A Candidate Relativistic Tidal Disruption Event at 340 Mpc”. In: *ApJ* 945.2, 142 (Mar. 2023), p. 142. DOI: 10.3847/1538-4357/acbafc.
- [4] Jean J. Somalwar et al. “The first systematically identified repeating partial tidal disruption event”. In: *arXiv e-prints*, arXiv:2310.03782 (Oct. 2023), arXiv:2310.03782. DOI: 10.48550/arXiv.2310.03782. arXiv: 2310.03782 [astro-ph.HE].

- [5] Jean J. Somalwar et al. “VLASS tidal disruption events with optical flares I: the sample and a comparison to optically-selected TDEs”. In: *arXiv e-prints*, arXiv:2310.03791 (Oct. 2023), arXiv:2310.03791. DOI: 10.48550/arXiv.2310.03791. arXiv: 2310.03791 [astro-ph.HE].
- [6] Jean J. Somalwar et al. “The Nascent Milliquasar VT J154843.06+220812.6: Tidal Disruption Event or Extreme Accretion State Change?”. In: *ApJ* 929.2, 184 (Apr. 2022), p. 184. DOI: 10.3847/1538-4357/ac5e29. arXiv: 2108.12431 [astro-ph.HE].
- [7] Jean J. Somalwar et al. “Harnessing the Population Statistics of Subhalos to Search for Annihilating Dark Matter”. In: *ApJ* 906.1, 57 (Jan. 2021), p. 57. DOI: 10.3847/1538-4357/abc87d.
- [8] Jean Somalwar et al. “Spatially Resolved UV Diagnostics of AGN Feedback: Radiation Pressure Dominates in a Prototypical Quasar-driven Superwind”. In: *ApJL* 890.2, L28 (Feb. 2020), p. L28. DOI: 10.3847/2041-8213/ab733d.
- [9] Jean J. Somalwar et al. “Hyper Suprime-Cam Low Surface Brightness Galaxies. II. A Hubble Space Telescope Study of the Globular Cluster Systems of Ultradiffuse Galaxies in Groups”. In: *ApJ* 902.1, 45 (Oct. 2020), p. 45. DOI: 10.3847/1538-4357/abb1b2.

## All Publications

- [1] Jakob T. Faber et al. “A Heavily Scattered Fast Radio Burst Is Viewed Through Multiple Galaxy Halos”. In: *arXiv e-prints*, arXiv:2405.14182 (May 2024), arXiv:2405.14182. DOI: 10.48550/arXiv.2405.14182. arXiv: 2405.14182 [astro-ph.HE].
- [2] A. C. S. Readhead et al. “Compact Symmetric Objects. III. Evolution of the High-luminosity Branch and a Possible Connection with Tidal Disruption Events”. In: *ApJ* 961.2, 242 (Feb. 2024), p. 242. DOI: 10.3847/1538-4357/ad0c55.
- [3] Yashvi Sharma et al. “Dramatic Rebrightening of the Type-changing Stripped-envelope Supernova SN 2023aew”. In: *ApJ* 966.2, 199 (May 2024), p. 199. DOI: 10.3847/1538-4357/ad3758.
- [4] Myles B. Sherman et al. “Deep Synoptic Array Science: Polarimetry of 25 New Fast Radio Bursts Provides Insights into Their Origins”. In: *ApJ* 964.2, 131 (Apr. 2024), p. 131. DOI: 10.3847/1538-4357/ad275e.
- [5] Yuhan Yao et al. “Sub-relativistic Outflow and Hours-Timescale Large-amplitude X-ray Dips during Super-Eddington Accretion onto a Low-mass Massive Black Hole in the Tidal Disruption Event AT2022lri”. In: *arXiv e-prints*, arXiv:2405.11343 (May 2024), arXiv:2405.11343. DOI: 10.48550/arXiv.2405.11343. arXiv: 2405.11343 [astro-ph.HE].
- [6] Liam Connor et al. “Deep Synoptic Array Science: Two Fast Radio Burst Sources in Massive Galaxy Clusters”. In: *ApJL* 949.2, L26 (June 2023), p. L26. DOI: 10.3847/2041-8213/acd3ea.
- [7] Liam Connor et al. “Deep Synoptic Array science: Two fast radio burst sources in massive galaxy clusters”. In: *arXiv e-prints*, arXiv:2302.14788 (Feb. 2023), arXiv:2302.14788. DOI: 10.48550/arXiv.2302.14788. arXiv: 2302.14788 [astro-ph.HE].
- [8] Erica Hammerstein et al. “The Final Season Reimagined: 30 Tidal Disruption Events from the ZTF-I Survey”. In: *ApJ* 942.1, 9 (Jan. 2023), p. 9. DOI: 10.3847/1538-4357/aca283.
- [9] Vikram Ravi et al. “Deep Synoptic Array science: a 50 Mpc fast radio burst constrains the mass of the Milky Way circumgalactic medium”. In: *arXiv e-prints*, arXiv:2301.01000 (Jan. 2023), arXiv:2301.01000. DOI: 10.48550/arXiv.2301.01000. arXiv: 2301.01000 [astro-ph.GA].
- [10] Kritti Sharma et al. “Deep Synoptic Array Science: A Massive Elliptical Host Among Two Galaxy-cluster Fast Radio Bursts”. In: *ApJ* 950.2, 175 (June 2023), p. 175. DOI: 10.3847/1538-4357/accf1d.
- [11] Myles B. Sherman et al. “Deep Synoptic Array Science: Implications of Faraday Rotation Measures of Fast Radio Bursts Localized to Host Galaxies”. In: *ApJL* 957.1, L8 (Nov. 2023), p. L8. DOI: 10.3847/2041-8213/ad0380.
- [12] Yuhan Yao et al. “Tidal Disruption Event Demographics with the Zwicky Transient Facility: Volumetric Rates, Luminosity Function, and Implications for the Local Black Hole Mass Function”. In: *ApJL* 955.1, L6 (Sept. 2023), p. L6. DOI: 10.3847/2041-8213/acf216.
- [13] Igor Andreoni et al. “A very luminous jet from the disruption of a star by a massive black hole”. In: *Nature* 612.7940 (Dec. 2022), pp. 430–434. DOI: 10.1038/s41586-022-05465-8.
- [14] Vikram Ravi et al. “The host galaxy and persistent radio counterpart of FRB 20201124A”. In: *MNRAS* 513.1 (June 2022), pp. 982–990. DOI: 10.1093/mnras/stac465.

## Talks

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### Invited Talks

- Kavli Institute for Theoretical Physics “Anticipating the Rising Tide of Tidal Disruption Events: Theory and Observations”, Apr. 2024, KITP Santa Barbara: *Discovering Tidal Disruption Events in Radio Surveys*
- American Astronomical Society Meeting 241, Jan 2023, Seattle WA: *You have found the host galaxy of a transient. What next?*
- VLASS transients workshop, Oct 2021, Virtual: *The nascent milliquasar VT J154843.06+220812.6: tidal disruption event or extreme accretion-state change?*
- Joint Space-Science Institute Workshop, “Winds throughout the Universe”, Oct 2023, Annapolis MD: *Jets, Outflows, and Winds from Tidal Disruption Events*
- ASKAP Variables and Slow Transients Meeting, Sept. 2023, virtual: *“Tidal disruption events in the VLA Sky Survey”*

### Contributed Talks

- IPTA 2024 Science Week, Jun. 2024, Sexten IT: *Constraining the origin of the nHz GWB using a simple flexible model of black hole evolution*
- Intermediate-Mass Black Holes: the dawn of a revolutionary era, Dec 2023, Belize: *A blind radio search for tidal disruption events and implications for IMBHs*
- MIT Monday Afternoon Talk, May 2023, Cambridge MA: *Tidal disruption events in the VLA Sky Survey*
- Columbia Theoretical High Energy Astrophysics Seminar, May 2023, New York, NY: *Tidal disruption events in the VLA Sky Survey*
- Naval Research Laboratory Talk Series, Apr. 2023, Washington DC: *Tidal disruption events in the VLA Sky Survey*
- NRAO Lunch Talk, Apr 2023, Socorro NM: *Tidal disruption events in the VLA Sky Survey*
- Scientific Frontiers and Synergies for the DSA-2000 Radio Camera, Mar 2023, Pasadena CA: *Searching for Tidal Disruption Events using Radio Survey*
- Radboud Lunch Journal Club, Jun. 2023, Nijmegen NL: *Tidal disruption events in the VLA Sky Survey*
- American Astronomical Society Meeting 240, Jan 2023, Pasadena CA: *Tidal Disruption Events in the VLA Sky Survey*
- New frontiers in supermassive black holes, Oct 2022, Cornell: *Searching for radio TDEs with the VLA Sky Survey*
- The VLA Sky Survey in the Multiwavelength Spotlight, Sept. 2022, Socorro NM: *Tidal disruption events in the VLA Sky Survey*
- Zwicky Transient Facility Paris Team Meeting, Apr. 2022, Paris FR: *Combined constraints on tidal disruption events from optical and radio surveys*
- Hyper Suprime-Cam Low Redshift Working Group Meeting, May 2021, Virtual: *Globhunt: searching for globular clusters in HSC survey data*
- New Perspectives Conference, June 2017, Fermilab Chicago: *“Search for low-mass pair-produced dijet resonances using jet substructure techniques in proton-proton collisions at  $\sqrt{s} = 13$  TeV”*

### Professional Service

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- Referee for MNRAS and ApJ

### Outreach and Diversity

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- Astro on tap talk, XX
- Graduate School Panel, Carnegie Observatories, XX
- Volunteer, astro on tap, XX
- Volunteer, astro star gazing lectures
- Grad student mentor, XX