

# Viraj Karambelkar

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## Education

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- **PhD** Astrophysics, California Institute of Technology, USA [October 2019 - Present]
  - Thesis: *The landscape of mergers through a time-domain lens*
  - Advisor: Prof. Mansi Kasliwal
- **MS** Astrophysics, California Institute of Technology, USA [October 2019 - October 2021]
- **B. Tech. with Honors** Indian Institute of Technology, Bombay, India [July 2015 - July 2019]
  - Major: *Engineering Physics*
  - Minor: *Mathematics*
- **Intermediate/+2** P. Jog Junior College, Pune, India [July 2013 - July 2015]
  - 96.31 percentage, first in the institute
- **Matriculation** Kamalnayan Bajaj School, Pune, India [June 2004 - June 2013]
  - 96.73 percentage, first in the institute

## Research Interests

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- Optical and Infrared Time domain astronomy, Multi-messenger Astronomy, observational high energy astrophysics, stellar variables, astroinformatics
  - Electromagnetic followup of gravitational waves
  - Low luminosity, red transients (stellar mergers, intermediate luminosity red transients) in the local universe
  - R-Corone-Borealis and Hydrogen-deficient Carbon stars
  - Large amplitude, long period variable stars
  - Data processing for wide-field infrared time domain surveys

## Honors and Awards

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- Selected as the **Neugebauer Scholar** of Astrophysics, Caltech, USA [2023]
- **Visiting Undergraduate Research Program**, Caltech, USA [2018]
- Awarded the **Institute Academic Prize** for exceptional academic performance at IIT Bombay. [2017]
- **All India Rank 65**-JEE Mains, **AIR 196**-JEE Advanced among 1 million students for entry to IITs. [2015]
- Recipient of the **INSPIRE** fellowship, awarded to top 1 percentile of students by the Govt. of India. [2015]
- Awarded the **Kishore Vaigyanik Protsahan Yojna (KVPY)** fellowship by the Dept. of Science and Technology, Govt. of India with an **All India Rank of 99**. [2015]
- Recipient of the **National Talent Search Scholarship (NTSE)** awarded by the National Centre for Education Research and Training to top 1000 students in India. [2011]

## Publications

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As of November 2023 (via [ADS Metrics](#)),

- Total refereed: 43 (including 5 as first author)
- Total citations: 1052; h-index:18; i10-index:22
- Full list - [ADS Library](#)

## Selected Refereed Publications with major contributions

- [1] Kishalay De, Morgan MacLeod, Viraj Karambelkar, Jacob E. Jencson, Deepto Chakrabarty, Charlie Conroy, et al. “An infrared transient from a star engulfing a planet”. In: *Nature* 617.7959 (May 2023), pp. 55–60. DOI: [10.1038/s41586-023-05842-x](https://doi.org/10.1038/s41586-023-05842-x).
- [2] Georgios Dimitriadis, Kate Maguire, Viraj R. Karambelkar, Ryan J. Lebron, Chang Liu, Alexandra Kozyreva, et al. “SN 2021zny: an early flux excess combined with late-time oxygen emission suggests a double white dwarf merger event”. In: *MNRAS* 521.1 (May 2023), pp. 1162–1183. DOI: [10.1093/mnras/stad536](https://doi.org/10.1093/mnras/stad536). arXiv: [2302.08228](https://arxiv.org/abs/2302.08228) [astro-ph.HE].
- [3] Viraj R. Karambelkar, Mansi M. Kasliwal, Nadejda Blagorodnova, Jesper Sollerman, Robert Aloisi, Shreya G. Anand, et al. “Volumetric Rates of Luminous Red Novae and Intermediate-luminosity Red Transients with the Zwicky Transient Facility”. In: *ApJ* 948.2, 137 (May 2023), p. 137. DOI: [10.3847/1538-4357/acc2b9](https://doi.org/10.3847/1538-4357/acc2b9). arXiv: [2211.05141](https://arxiv.org/abs/2211.05141) [astro-ph.HE].
- [4] Danielle Frostig, Sylvia Biscoveanu, Geoffrey Mo, Viraj Karambelkar, Tito Dal Canton, Hsin-Yu Chen, et al. “An Infrared Search for Kilonovae with the WINTER Telescope. I. Binary Neutron Star Mergers”. In: *ApJ* 926.2, 152 (Feb. 2022), p. 152. DOI: [10.3847/1538-4357/ac4508](https://doi.org/10.3847/1538-4357/ac4508). arXiv: [2110.01622](https://arxiv.org/abs/2110.01622) [astro-ph.HE].
- [5] V. Karambelkar, M. M. Kasliwal, P. Tisserand, G. C. Clayton, C. L. Crawford, S. G. Anand, et al. “R Coronae Borealis and dustless hydrogen-deficient carbon stars likely have different oxygen isotope ratios”. In: *A&A* 667, A84 (Nov. 2022), A84. DOI: [10.1051/0004-6361/202142918](https://doi.org/10.1051/0004-6361/202142918). arXiv: [2112.07692](https://arxiv.org/abs/2112.07692) [astro-ph.SR].
- [6] Mansi Dhuria, Viraj Karambelkar, Vikram Rentala, and Priyanka Sarmah. “A strong broadband 21 cm cosmological signal from dark matter spin-flip interactions”. In: *JCAP* 2021.8, 041 (Aug. 2021), p. 041. DOI: [10.1088/1475-7516/2021/08/041](https://doi.org/10.1088/1475-7516/2021/08/041).
- [7] Viraj R. Karambelkar, Mansi M. Kasliwal, Kate Maguire, Shreya G. Anand, Igor Andreoni, Kishalay De, et al. “Faintest of Them All: ZTF 21aaryiz/SN 2021fcg-Discovery of an Extremely Low Luminosity Type Ia Supernova”. In: *ApJ* 921.1, L6 (Nov. 2021), p. L6. DOI: [10.3847/2041-8213/ac2e90](https://doi.org/10.3847/2041-8213/ac2e90). arXiv: [2110.04306](https://arxiv.org/abs/2110.04306) [astro-ph.HE].
- [8] Viraj R. Karambelkar, Mansi M. Kasliwal, Patrick Tisserand, Kishalay De, Shreya Anand, Michael C. B. Ashley, et al. “Census of R Coronae Borealis Stars. I. Infrared Light Curves from Palomar Gattini IR”. In: *ApJ* 910.2, 132 (Apr. 2021), p. 132. DOI: [10.3847/1538-4357/abe5aa](https://doi.org/10.3847/1538-4357/abe5aa). arXiv: [2012.11629](https://arxiv.org/abs/2012.11629) [astro-ph.SR].
- [9] N. Blagorodnova, V. Karambelkar, S. M. Adams, M. M. Kasliwal, C. S. Kochanek, S. Dong, et al. “Progenitor, precursor, and evolution of the dusty remnant of the stellar merger M31-LRN-2015”. In: *MNRAS* 496.4 (Aug. 2020), pp. 5503–5517. DOI: [10.1093/mnras/staa1872](https://doi.org/10.1093/mnras/staa1872). arXiv: [2004.04757](https://arxiv.org/abs/2004.04757) [astro-ph.SR].
- [10] V. R. Karambelkar, S. M. Adams, P. A. Whitelock, M. M. Kasliwal, J. E. Jencson, M. L. Boyer, et al. “SPIRITS Catalog of Infrared Variables: Identification of Extremely Luminous Long Period Variables”. In: *ApJ* 877.2, 110 (June 2019), p. 110. DOI: [10.3847/1538-4357/ab1a41](https://doi.org/10.3847/1538-4357/ab1a41). arXiv: [1901.07179](https://arxiv.org/abs/1901.07179) [astro-ph.SR].

## Successful Observing Proposals

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### PI proposals

- James Webb Space Telescope (Cycle 2, 10.1 hours)  
*Are Luminous Red Novae major factories of cosmic dust?*
- Hubble Space Telescope (Cycle 30, 2 orbits)  
*In search of the remnant of SN 2021fcg – detonation, deflagration or merger?*
- NASA-IRTF/iShell (2022B, 2 nights)  
*Telling them apart : Identifying the first chemical differences between R Coronae Borealis and dustless HdC stars*
- NASA-IRTF/Spex (2021B, 4 nights)  
*An Infrared census of R Coronae Borealis stars*
- Palomar 200-inch (2023B, 2 nights)  
*Completing the census of large amplitude variable stars identified by Palomar-Gattini IR*
- Swift (ToO, 2.5 ks) approved *Swift* observations

### Co-I proposals

- Hubble Space Telescope (Cycle 29, SNAP) *UV Spectroscopy of Astronomical Transients through Rolling Snapshots*
- VLA (Director's Discretionary Time, 6 hours) *Chasing a very bright GRB at VLA frequencies - GRB 230812B*
- VLA (Director's Discretionary Time, 1 hour) *IRAS 19148+1138: an Asymptotic Giant Branch star candidate in VLASS*
- Keck 1+2 (2022A - 2024A, 15 nights) *Census of the Local Universe*
- Palomar 200-inch (2021A-2023A, 29 nights) *The Dynamic IR Sky*
- NASA-IRTF (2023B, 2 nights) *Luminous mid-infrared transients in M31*
- NASA-IRTF (2022A, 2 nights) *Uncovering the peculiar mass loss histories of Symbiotic X-ray binaries*

## Invited Talks

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- 'The landscape of mergers through a time-domain lens' USA  
*Princeton University* [2023]
- 'It's about time(-domain)! The landscape of astrophysical mergers' India  
*International Center for Theoretical Physics* [2023]
- 'Searching for kilonovae in the infrared' India  
*Inter-University Center for Astronomy and Astrophysics* [2023]

## Contributed Talks and Posters

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- Talk - 'How common are common envelope transients?' Krakow, Poland  
*EAS Meeting* [2023]
- Talk - 'Luminous Red Novae : Probes of Common Envelope Evolution in massive binaries' UIUC, USA  
*Transient and Variable Universe* [2023]
- Talk - 'Luminous Red Novae : Probes of Common Envelope Evolution in massive binaries' Pasadena, USA  
*Palomar Science Meeting* [2023]
- Talk - 'SN2021feg and the population of low-luminosity Iax supernovae' Santa Barbara, USA  
*White Dwarfs -* [2022]
- Talk - 'SN2021feg and the population of low-luminosity Iax supernovae' Pasadena, USA  
*AAS 240th Meeting* [2023]
- Talk - 'NIR searches for kilonovae with WINTER and Roman' Pasadena, USA  
*Exploring the Transient Universe with the Roman Space Telescope Conference* [2022]
- Poster - 'Faintest of them all : SN 2021feg an extremely low luminosity type Iax supernova ' San Diego, CA  
*Keck Science Meeting* [2021]
- Poster - 'Faintest of them all : SN 2021feg an extremely low luminosity type Iax supernova ' Virtual  
*Super Virtual Conference* [2021]
- Talk on 'Probing the brightest dusty variables: A SPIRITS catalog of variables' Hawaii, USA  
*AAS 235 meeting* [2020]
- Poster - 'Probing the brightest dusty variables: A SPIRITS catalog of variables' Mumbai, India  
*GROWTH conference* [2018]
- Poster - 'Watching the cosmic tango : The GROWTH-India Telescope' Mumbai, India  
*Nobel Prize lectures* [2017]

## Service

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- Peer review - Reviewed 5 papers for ApJ, AJ, A&A and MNRAS [2022 - present]
- Writer at Astrobites - wrote 13 articles summarizing research papers at a level accessible to undergrads[2020-2022]
- Co-manager, Cahill Rooftop Observatory, Caltech [Summer 2021-Present]
- Head, Students Association Physics Department, IIT Bombay [2018-2019]
- Department Academic Mentor, IIT Bombay [2017-2019]

## Workshops Attended

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- SMA Interferometry school Virtual  
*Sub-mm Array* [2021]
- ZTF Summer Undergraduate Astronomy School Pasadena, USA  
*Caltech* [2018]
- National Institute for Undergraduate Studies Physics Camp Mumbai, India  
*Homi Bhabha Center for Science Education* [2016]
- GIAN Course on Superoscillations and weak measurements Kolkata, India  
*Indian Institute of Science Education and Research Kolkata* [2017]
- National Talent Search Scholars Nurturance Camp Mumbai, India  
*Homi Bhabha Center for Science Education* [2012]

## Teaching

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### University Teaching

- TA for Ay126 at Caltech (graduate course on “Interstellar Medium”) [Spring 2021]
- TA for Ay122b at Caltech (graduate course on “Radio Astronomy”) [Winter 2021]
- TA for Ay121 at Caltech (graduate course on “Radiative Processes”) [Fall 2021]
- TA for Ph108 at IIT Bombay (undergraduate course on “Electromagnetism”) [Spring 2019]
- TA for MA105 at IIT Bombay (undergraduate course on “Calculus”) [Autumn 2016]

### Workshops

- Tutor for *GROWTH* Summer School (Virtual) [Summer 2020]
- Tutor for *GROWTH* Winter School (IIT Bombay) [Winter 2018]