Viraj Karambelkar

California Institute of Technology
1200 E. California Blvd, MC 249-17
Pasadena, CA 91125

Email: viraj@astro.caltech.edu
Website: virajkaram.github.io

Education

- **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

- 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-Coronae-Borealis and Hydrogen-deficient Carbon stars
  - Large amplitude, long period variable stars
  - Data processing for wide-field infrared time domain surveys

Honors and Awards

- 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

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.

[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. arXiv: 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. arXiv: 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. arXiv: 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. arXiv: 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.

[7] Viraj R. Karambelkar, Mansi M. Kasliwal, Kate Maguire, Shreya G. Anand, Igor Andreoni, Kishalay De, et al. "Faintest of Them All: ZTF 21aaoryiz/SN 2021fcg-Discovery of an Extremely Low Luminosity Type Iax Supernova". In: *ApJ* 921.1, L6 (Nov. 2021), p. L6. DOI: 10.3847/2041-8213/ac2e90. arXiv: 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. arXiv: 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. arXiv: 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. arXiv: 1901.07179 [astro-ph.SR].

Successful Observing Proposals

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

- '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

- 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 - 'SN2021fcg and the population of low-luminosity Iax supernovae' — Santa Barbara, USA
  White Dwarfs - [2022]
- Talk - 'SN2021fcg 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 2021fcg an extremely low luminosity type Iax supernova ' — San Diego, CA
  Keck Science Meeting [2021]
- Poster - 'Faintest of them all : SN 2021fcg 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

- 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

- 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

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]