RISHABH SINGH TEJA

Postdoctoral Researcher
Indian Institute of Astrophysics
Bengaluru, Karnataka, India

Namaste! Hello! Greetings!

I am working on the photometric and spectroscopic observations, analysis, and hydrodynamical modeling of Core-Collapse Supernovae. I am also interested in data science. I intend to apply my learnings in various aspects of Time Domain Astronomy.

Interests/Hobbies/Others

- Love playing both indoor and outdoor games; reading fiction books; Ardent Cinema lover; Tech enthusiast
- Been in editorial & design roles for IIA's science e-Magazine 'DOOT' (Served as its Chief Editor during 2023-24)
- Served in IIA's computer committee as student representative

National Exams Qualified

- National Defence Academy/NA (2013)
- Combined Defence Services (2015 & 2016)
- IIT-Joint Admission Test for Masters (2017)
- CSIR-National Eligibility Test (2018)
- CSIR-Junior Research Fellowship (2018 & 2019)
- GATE (2019)

Societies

- **Life member**, *Astronomical Society of India (ASI)* **[L2454]**

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Education

High School (10th) 2011 — 2012 **1st Division**
Hilton Convent Senior Secondary School, Amroha, UP-244221
Hindi, English, Maths, Science, and Social Studies

Intermediate (12th) 2012 — 2014 **1st Division**
Hilton Convent Senior Secondary School, Amroha, UP-244221
Maths, Physics, Chemistry, English, and Physical Education

Graduation (B.Sc. (H) Physics) 2014 — 2017 **1st Division**
Ramjas College, University of Delhi, Delhi-110009
Physics and related subjects + Mathematics and Chemistry (2 sem)

Post-Graduation (M.Sc. Physics) 2017 — 2019 **1st Division [Gold Medal]**
Department of Physics & Astrophysics, University of Delhi, Delhi-110009
[Affiliation: Hansraj College, University of Delhi]
Classical, Quantum, Stastitical, Nuclear (Lab+Theory), Electrodynamics, GR & Cosmology, and Astronomy

Ph. D. (Astronomy & Astrophysics) 2019 — 2025
Indian Institute of Astrophysics, Bengaluru, Karnataka-560034
[Affiliation: Pondicherry University]
Thesis Title: ***An observational perspective into the nature of short-plateau Type II supernovae*** *[Submitted Oct-2024; Awaiting reviewers' report & defense]*

Skills

Tools / Softwares *MESA Star, STELLA, IRAF, PyRAF, Git, Linux, Syn++, InDesign*

Programming Languages *Python, C and C++*

Languages *Hindi (Mother Tongue), English, Punjabi(Speak)*

Data Reduced & Used *2.0-m HCT, India; Swift/UVOT; AstroSat/UVIT; 0.7-m GIT; 3.6-m DOT; 1.5-m Kanata, Japan*

Others *MS-Office, matplotlib, emcee, jupyterlab,, HTML, Javascript, Adobe InDesign, LaTeX, Machine Learning Basics, CSS*

Philosophy

I believe in working hard with utmost honesty. I am always eager to learn new things, whether new tools, concepts, or even sports. I am a keen listener and love to hear about different things from everyone. I believe in self-learning and followed it most of my life. I have experienced that, howsoever challenging things may seem, if we keep working hard, it eventually bears fruit and presents us with wonderful outcomes. I like to do everything with utmost dedication and passion.

List of Publications

ADS Library Link: https://ui.adsabs.harvard.edu/public-libraries/fday_osYRtKaHQapRx80dA

A). First/Corresponding Author

1. ***SN 2020jfo: A Short-plateau Type II Supernova from a Low-mass Progenitor***
Rishabh Singh Teja, Avinash Singh, D. K. Sahu, G. C. Anupama, Brajesh Kumar, & Nayana A. J.
The Astrophysical Journal, Volume 930, Issue 1, id.34, 19 pp. 2022 May 1 doi:10.3847/1538-4357/ac610b

2. ***Far-ultraviolet to Near-infrared Observations of SN 2023ixf: A High-energy Explosion Engulfed in Complex Circumstellar Material***
Rishabh Singh Teja, Avinash Singh , Judhajeet Basu, G. C. Anupama, D. K. Sahu, Anirban Dutta, Vishwajeet Swain, Tatsuya Nakaoka, Utkarsh Pathak, Varun Bhalerao, Sudhanshu Barway, Harsh Kumar, Nayana A. J., Ryo Imazawa, Brajesh Kumar, & Koji S. Kawabata
The Astrophysical Journal Letters, Volume 954, Issue 1, id.L12, 10 pp.2023 September 1 doi:10.3847/2041-8213/acef20

3. ***SN 2018gj: A Short Plateau Type II Supernova with Persistent Blueshifted Ha Emission***
Rishabh Singh Teja, Avinash Singh, D. K. Sahu, G. C. Anupama, Brajesh Kumar, Tatsuya Nakaoka, Koji S. Kawabata, Masayuki Yamanaka, Ali Takey, & Miho Kawabata
The Astrophysical Journal, Volume 954, Issue 2, id.155, 23 pp. 2023 September 10 doi: 10.3847/1538-4357/acdf5e

4. ***SN 2021wvw: A core-collapse supernova on the sub-luminous, slower and shorter end of Type IIPs***
Rishabh Singh Teja, Jared A. Goldberg, D. K. Sahu, G. C. Anupama, Avinash Singh, Vishwajeet Swain, & Varun Bhalerao
The Astrophysical Journal, Volume 974, Issue 1, id.44, 14 pp. 2024 October 10 doi: 10.3847/1538-4357/ad67d9

5. ***Unravelling the asphericities in the explosion and multi-faceted circumstellar matter of SN 2023ixf***
Avinash Singh, **Rishabh Singh Teja**, T.J. Moriya, K. Maeda, K.S. Kawabata, M. Tanaka, R. Imazawa, T. Nakaoka, A. Gangopadhyay, M. Yamanaka, V. Swain, D.K. Sahu, G.C. Anupama, B. Kumar, R.M. Anche, Y. Sano, A. Raj, V. K. Agnihotri, V. Bhalerao, D. Bisht, M. S. Bisht, K. Belwal, S. K. Chakrabarti, M. Fujii, T. Nagayama, K. Matsumoto, T. Hamada, M. Kawabata, A. Kumar, R. Kumar, B.K. Malkan, P. Smith, Y. Sakagami, K. Taguchi, N. Tominaga, & A. Watanabe
The Astrophysical Journal, Volume 975:132 (24pp), 2024 November 1 doi: 10.3847/1538-4357/ad7955

B). Other contributed publications

1. ***Optical studies of a bright Type Iax supernova SN 2020rea***
Mridweeka Singh et al. [including Rishabh Singh Teja] **MNRAS**, Volume 517, Issue 4, pp.5617-5626
doi:10.3847/1538-4357/ad2618

2. ***SN 2020udy: A New Piece of the Homogeneous Bright Group in the Diverse Iax Subclass***
Mridweeka Singh et al. [including Rishabh Singh Teja] **ApJ**, Volume 965, Issue 1, id.73, 14 pp.
doi:10.1093/mnras/stac3059

3. ***Intermediate-luminosity Type IIP SN 2021gmj: a low-energy explosion with signatures of circumstellar material***
Yuta Murai, Masaomi Tanaka, Miho Kawabata, Kenta Taguchi, Rishabh Singh Teja ... (others) **MNRAS,** Volume 528, Issue 3, pp.4209-4227 doi:10.1093/mnras/stae170

4. ***The enigmatic double-peaked stripped-envelope SN 2023aew***
Tuomas Kangas et al. [including Rishabh Singh Teja] **A&A**, Volume 689, id.A182, 35 pp.
doi:10.1051/0004-6361/202449420

5. ***Characterizing the Ordinary Broad-line Type Ic SN 2023pel from the Energetic GRB 230812B***
Gokul P. Srinivasaragavan et al. [including Rishabh Singh Teja] **ApJL**, Volume 960, Issue 2, id.L18, 15 pp.
doi:10.3847/2041-8213/ad16e7

6. ***Bridging between Type IIb and Ib Supernovae: SN IIb 2022crv with a Very Thin Hydrogen Envelope***
Anjasha Gangopadhyay et al. [including Rishabh Singh Teja] **ApJ**, Volume 957, Issue 2, id.100, 21 pp.
doi:10.3847/1538-4357/acfa94

7. ***Observational Properties of a Bright Type Iax SN 2018cni and a Faint Type Iax SN 2020kyg***
Mridweeka Singh et al. [including Rishabh Singh Teja] **ApJ**, Volume 953, Issue 1, id.93, 14 pp.
doi:10.3847/1538-4357/acd559

(Contd.)

8. ***The unluckiest star: A spectroscopically confirmed repeated partial tidal disruption event AT 2022dbl***
Zheyu Lin et al. [including Rishabh Singh Teja] **ApJL,** Volume 971, Issue 1, id.L26, 14 pp.
doi:10.3847/2041-8213/ad638e

9. ***SN 2023tsz: A helium-interaction driven supernova in a very low-mass galaxy***
B. Warwick et al. [including Rishabh Singh Teja] **[Submitted MNRAS]** arxiv:2409.1414

C). Conference Proceedings

1. ***Observations and modelling of two Type IIP supernovae in M61: Similar yet so different.***
Rishabh Singh Teja, G. C. Anupama & D. K. Sahu
Massive Stars Near and Far, Edited by J. Mackey, J.S. Vink and N. St-Louis. ***Proceedings of the International Astronomical Union,*** Volume 361, held 8-13 May 2022 in Ballyconnell, Ireland. Cambridge University Press, 2024, pp. 610-611 doi:10.1017/S1743921322002034

2. ***Radiating research, experiences and much more from the Indian Institute of Astrophysics to the world; A student-led initiative.***
Rishabh Singh Teja et al. (January 2024)
42nd meeting of the Astronomical Society of India (ASI), held 31 January-04 February 2024, in Bengaluru, India. Hosted jointly by IISc, ISRO, JNP id.P261 2024asi..confP.261T

Visits & Conferences

A). INTERNATIONAL

1. **Poster** presented on ***"Observations and modelling of two Type IIP supernovae in M61"*** in IAU Symposium 361: Massive Stars Near and Far organized at Ballyconnell, Ireland in May 2022 **[Conference Attended]**

2. **Poster** presented on ***"Origins of a short plateau type II supernova, SN 2020jfo: Low mass RSG or binary?"*** in SuperVirtual-2022 conference organised virtually in November 2022

3. **Contributed talk** given on ***"Understanding Type IIP progenitors with emphasis on short plateau SNe"*** in India/Japan internal collaboration meeting on transients and supernovae held organised by Hiroshima Astrophysical Science Center at the Higashi-Hiroshima campus in Hiroshima University in March 2023 **[Collaborative Visit]**

4. **Contributed talk** given on ***"Low mass red supergiants as the plausible origins of Type II supernovae with short plateau"*** in SuperVirtual 2023 conference organised virtually in November 2023

5. **Invited talk opportunity** at Special Session, entitled ***"SN 2023ixf: The Closest Supernova in a Decade,"*** in the 243rd Annual Meeting of the American Astronomical Society, New Orleans, LA, 7–11 January 2024 [**Undelivered** due to travelling constraints]

6. **Invited talk** given on ***"Decadal SN 2023ixf in FUV to NIR: A High-energy Explosion Engulfed in Complex CSM; Early days and beyond"*** in SN 2023ixf, The Decadal Supernova in M101 workshop jointly organized by Weizmann Institute of Science, Israel and ESO, Garching at ESO in Garching, Germany in June 20241. **[Workshop Attended]**

A). NATIONAL

1. **Poster** presented on ***" Observational studies of a short plateau Type IIP supernova 2020jfo"***, in the 40th Astronomical Society of India meeting, organized by ARIES and IIT Roorkee at IIT Roorkee in March 2022.

2. **Contributed talk** given on ***"Panchromatic observations and modelling of two Type II supernovae in M61: Similar origins yet different fates"*** in Young Astronomers' Meet-2022 organised by ARIES, Nainital in November 2022

3. **Contributed talk** given on ***"Nearest supernova in decade 2023ixf: Rapid multi-wavelength follow-up & analysis using space and ground-based facilities"*** in National Space & Science Symposium-2024 organised at Goa University, Goa in Feburary 2024

Other Achievements

- ***Awarded certificate of merit in high school (CGPA 10.0)***
- ***Under top 10 in the district in high school results***
- ***Awarded Dr. K.S. Krishnan Gold Medal for highest marks in the University in M.Sc (2019)***
- ***Best Paper Presentation Award at the National Space & Science Symposium-2024, Goa, India***