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Saurabh

Curriculum Vitae

Academic Positions

Dec 2026–present **Postdoctoral Research Associate**,
TomoGrav project, AI³ (Astronomical Imaging × Astrophysical Inference × Artificial Intelligence), BASP Lab, Institute of Sensors, Signals and Systems, Heriot-Watt University, Edinburgh, UK.

Aug–Nov 2026 **Postdoctoral Fellow**,
Max-Planck-Institut für Radioastronomie (MPIfR), Bonn, Germany.

Education

2023–2026 **Ph.D. in Astrophysics, *magna cum laude***,
Max-Planck-Institut für Radioastronomie (MPIfR) | University of Cologne, Germany.

Thesis: ***Fields, Flows, and the Fabric of Spacetime: Probing Horizon-Scale Physics in Active Galactic Nuclei***

Advisor: Prof. Dr. J. Anton Zensus

Nominated for the Otto Hahn Medal of the Max Planck Society, 2026

2021–2023 **M.Sc. (Physics), Specialisation in Astrophysics and Cosmology**,
P.D. Patel Institute of Applied Sciences, Charusat University, Gujarat, India.

Thesis: ***Probing fundamental physics near black holes with the next-generation Event Horizon Telescope (ngEHT)***

2017–2020 **B.Sc. Honours (Physics)**,
Department of Physics, Dyal Singh College, University of Delhi, India.

Research Interests

General Relativity and compact objects; tests of gravity with black-hole images; polarised general-relativistic ray-tracing and radiative transfer; GRMHD simulations of accretion flows and jets; VLBI and synthesis imaging; computational imaging and AI/machine-learning-driven astrophysical inference; black-hole tomography (3D reconstruction and movies); space VLBI; AGN jets; gravitational waves.

Technical Skills

Programming `Python, Julia, C/C++, Fortran, Bash, Mathematica, Scilab`

Codes GRMHD (KHARMA, iharm3D), ray-tracing (ipole, RAPTOR, GRMONTY), VLBI imaging (ehtim)

Developer GALLIFRAY (Bayesian geometric modelling of black-hole images), Rahu (GR ray-tracing library, in development), contributor to EinsteinPy

Fellowships/Grants

2024 Procope Mobility Grant – awarded by the *Ambassade de France en Allemagne*; research visit to Observatoire de Paris/LESIA

Scholastic Achievements

2022 1st Prize for Poster Presentation, Science Manthan 2022, Charusat University, India.

2020 1st Prize for Online Paper Presentation, University of Delhi. Topic: *Shadows cast by compact and ultracompact objects*

2020 1st Prize for Seminar Presentation, University of Delhi. Topic: *Shadows cast by compact and ultracompact objects*

Collaborations/Projects

(1) Event Horizon Telescope Collaboration (EHTC) – member since 2023; lead of the synthetic-data subgroup for the EHT 2026 M87* movie campaign

(2) TomoGrav – 3D reconstruction and movies of black holes, AI^3, Heriot-Watt University

(3) Next-Generation Event Horizon Telescope (ngEHT) Collaboration

(4) Space-based High Resolution Array for Radio astronomy and Physics (SHARP) – Proposal

(5) SWAN – Sky Watch Array Network, Raman Research Institute (RRI)

Teaching & Responsibilities

Summer 2025 Teaching Assistant – General Relativity and Cosmology, University of Bonn

2024–2025 IMPRS Representative for Ph.D. Students (Internal), MPIfR

2024–present Outreach and Social Media Committee, Event Horizon Telescope Collaboration

2018–present Founder, *Stellar Universe* – student organisation for astronomy and astrophysics outreach

2020 Project Mentor, Mentor-Mentee Program organised by SciRox, Guru Nanak Dev University, Amritsar, India

Observation Experience

Sep 2025 Effelsberg (100 m) Telescope, VLBI mode, Global Millimeter VLBI Array (GMVA) campaign

Sep 2024 Effelsberg (100 m) Telescope, VLBI mode, Global Millimeter VLBI Array (GMVA) campaign

Publications

Metrics INSPIRE-HEP (Nov 2026): 26 papers, 781 citations, h-index 13

Full lists INSPIRE-HEP | ORCID

Submitted

2026 **Saurabh**, Maciek Wielgus, Parth Bambhaniya, Elisabete M. de Gouveia Dal Pino, Andrei P. Lobanov, and Pankaj S. Joshi, "GRMHD accretion beyond the black hole paradigm: light from within the shadow", *submitted to Physical Review Letters* (under review), arXiv:2604.15430 (2026).

2026 **Saurabh**, et al., "Multi-frequency VLBI constraints on semi-analytic accretion–jet model of M87*", *submitted to Astronomy & Astrophysics* (2026).

2026 **Saurabh**, et al., "Testing gravitational physics with polarized hotspots", *submitted to Astronomy & Astrophysics* (2026).

First-author publications

2026 **Saurabh**, et al. (EHT Collaboration), "Probing jet base emission of M87* with the 2021 Event Horizon Telescope observations", *Astronomy & Astrophysics* **706**, A27 (2026).

2026 **Saurabh**, Maciek Wielgus, Arman Tursunov, Andrei P. Lobanov, and Razieh Emami, "Semi-analytic studies of accretion disk and magnetic field geometry in M87*", *Astronomy & Astrophysics* **705**, A166 (2026).

2024 **Saurabh**, Parth Bambhaniya, and Pankaj S. Joshi, "Imaging ultracompact objects with radiatively inefficient accretion flows", *Astronomy & Astrophysics* **682**, A113 (2024).

2023 **Saurabh** and Sourabh Nampalliwar, "GALLIFRAY — A geometric modeling and parameter estimation framework for black hole images using Bayesian techniques", *The Astrophysical Journal* **947**, 43 (2023).

2022 **Saurabh**, Parth Bambhaniya, and Pankaj S. Joshi, "Probing the shadow image of the Sagittarius A* with Event Horizon Telescope", arXiv:2202.00588 (2022).

2021 **Saurabh** and Kimet Jusufi, "Imprints of dark matter on black hole shadows using spherical accretions", *European Physical Journal C* **81**, 490 (2021).

2020 **Saurabh** and Himanshu Kumar, "The ageing problem of twins in Reissner–Nordström spacetime", *Modern Physics Letters A* **35**, 2050008 (2020).

Co-author/Corresponding publications (major contributions)

2026 Boris Georgiev, et al., incl. **Saurabh**, "Locating the missing large-scale emission in the jet of M87* with short EHT baselines", *Astronomy & Astrophysics* **709**, A26 (2026).

2026 Razieh Emami, et al., incl. **Saurabh**, "Novel polarimetric analysis of near-horizon flaring episodes in M87* in millimeter wavelength", *The Astrophysical Journal* **998**, 129 (2026).

2025 Event Horizon Telescope Collaboration, et al., incl. **Saurabh**, "Horizon-scale variability of M87* from 2017–2021 EHT observations", *Astronomy & Astrophysics* **704**, A91 (2025).

2025 Dimitry Ayzenberg, et al., incl. **Saurabh**, "Fundamental physics opportunities with future ground-based mm/sub-mm VLBI arrays", *Living Reviews in Relativity* **28**, 4 (2025).

2025 Parth Bambhaniya, **Saurabh**, and Elisabete M. de Gouveia Dal Pino, "Shadow formation conditions beyond the Kerr black hole paradigm", *Symmetry* **17**, 1384 (2025).

2025 Parth Bambhaniya, Viraj Kalsariya, **Saurabh**, Elisabete M. de Gouveia Dal Pino, Ivan De Martino, Riccardo Della Monica, and Mariafelicia De Laurentis, "Time delay of pulsar signals in astrophysical black hole spacetimes", *Physics of the Dark Universe* **49**, 102036 (2025).

2022 Parth Bambhaniya, **Saurabh**, Kimet Jusufi, and Pankaj S. Joshi, "Thin accretion disk in the Simpson–Visser black-bounce and wormhole spacetimes", *Physical Review D* **105**, 023021 (2022).

2022 Kimet Jusufi, **Saurabh**, Mustapha Azreg-Aïnou, Mubasher Jamil, Qiang Wu, and Cosimo Bambi, "Constraining wormhole geometries using the orbit of S2 star and the Event Horizon Telescope", *European Physical Journal C* **82**, 633 (2022).

2021 Sourabh Nampalliwar, **Saurabh**, Kimet Jusufi, Qiang Wu, Mubasher Jamil, and Paolo Salucci, "Modeling the Sgr A* black hole immersed in a dark matter spike", *The Astrophysical Journal* **916**, 116 (2021).

2021 Sourabh Nampalliwar and **Saurabh**, "Theory-agnostic tests of gravity with black hole shadows", arXiv:2108.01190 (2021).

2021 Kimet Jusufi and **Saurabh**, "Black hole shadows in Verlinde's emergent gravity", *Monthly Notices of the Royal Astronomical Society* **503**, 1310–1318 (2021).

2020 Shubham Kala, **Saurabh**, Hemwati Nandan, and Prateek Sharma, "Deflection of light and shadow cast by a dual-charged stringy black hole", *International Journal of Modern Physics A* **35**, 2050177 (2020).

Co-author/Collaboration publications

2026 Kazunori Akiyama, et al., incl. **Saurabh**, "The transformative power of ALMA2040 for mm-VLBI", arXiv:2610.22662 (2026).

2026 Hendrik Müller, et al., incl. **Saurabh**, "Dynamics and geometry of the inner sub-parsec-scale jet in 3C 279 observed with the Event Horizon Telescope", *Astronomy & Astrophysics* **713**, A274 (2026).

2026 G. Principe, et al., incl. **Saurabh**, "Broadband multiwavelength properties of the archetypal blazar 3C 279 during the 2017 Event Horizon Telescope campaign", *Astronomy & Astrophysics* **712**, A224 (2026).

2026 Ezequiel Albentosa-Ruiz, et al., incl. **Saurabh**, "Full-polarization millimeter wavelength variability of Sagittarius A* during the 2018 EHT campaign", *Astronomy & Astrophysics* **708**, A179 (2026).

2026 José L. Gómez, et al., incl. **Saurabh**, "Spatially resolved polarization swings in the supermassive binary black hole candidate OJ 287 with first Event Horizon Telescope observations", *Astronomy & Astrophysics* **705**, A23 (2026).

2026 Vadim Bernshteyn, et al., incl. **Saurabh**, "Ring asymmetry and spin in M87*", *The Astrophysical Journal* **1000**, 231 (2026).

2025 Rohan Dahale, et al., incl. **Saurabh**, "Origin of the ring ellipticity in the black hole images of M87*", *Astronomy & Astrophysics* **699**, A279 (2025).

2025 Ciriaco Goddi, et al., incl. **Saurabh**, "First polarization study of the M87 jet and active galactic nuclei at submillimeter wavelengths with ALMA", *Astronomy & Astrophysics* **699**, A265 (2025).

2020 Shreyas Bapat, et al., incl. **Saurabh**, "EinsteinPy: A community Python package for General Relativity", arXiv:2005.11288 (2020).

Selected Talks

Plenary

Jul 2025 *'Scientific outreach and social media overview'*, Event Horizon Telescope Collaboration Meeting 2025, Berlin, Germany

May 2024 *'Search for jet-base emission in M87* in the 2021 Event Horizon Telescope Observations'*, Event Horizon Telescope Collaboration Meeting 2024, Mexico City, Mexico

Invited

2025 *'Probing horizon scale magnetic fields and strong-field gravity with polarized EHT observations of M87*'*, International Centre for Theoretical Sciences (ICTS-TIFR), Bengaluru, India

2025 *'Probing horizon scale magnetic fields and strong-field gravity with polarized EHT observations of M87*'*, Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India

2024 *'Imaging ultra-compact objects with the Event Horizon Telescope'*, LESIA / Observatoire de Paris, Meudon, France

2024 *'Imaging ultra-compact objects with the Event Horizon Telescope'*, École Normale Supérieure, Paris, France

2024 *'Imaging ultra-compact objects with the Event Horizon Telescope'*, CENTRA – Center for Astrophysics and Gravitation, Lisbon, Portugal

Conferences

Oct 2025 *'Probing horizon scale magnetic fields and strong-field gravity with polarized VLBI observations'*, ERC×5 Jets, Schloss Ringberg, Germany

Sep 2023 *'Imaging (ultra) compact objects with radiatively inefficient accretion flows: Testing alternatives'*, M2FINDERS (Mapping Magnetic Fields down to Event horizon Scales) Workshop, Schloss Ringberg, Germany

Nov 2021 *'Investigation of deviation of GR in semi-analytic RIAF models'*, ngEHT (next-generation Event Horizon Telescope) Science Meeting

2021 *'Theory-independent test of General Relativity by analysing black hole images using VLBI'*, VLBI Splinter session, SKA Science Conference

2021 Oral Poster – *'GALLIFRAY – A geometric modelling and parameter estimation framework for black hole images using Bayesian techniques'*, RATOP (Relativistic Astrophysics, Theory and Observational Perspectives) Scientific Symposium

Co-curricular

Referee	The Astrophysical Journal (ApJ), Physical Review D (PRD)
Jul 2025	Organising Committee, Event Horizon Telescope Collaboration Meeting, Berlin, Germany
Dec 2023	Organising Committee, Virtual Event Horizon Telescope Collaboration Meeting
2020	Organised *Astro Retreat 2020*, an online meet for talks and poster presentations, with SciRox (Science Club, Guru Nanak Dev University, Amritsar)
2020	Volunteer at the LIGO-India booth (one week), Vigyan Samagam, Delhi

Outreach & Media

Outreach	Active science communicator for schools, universities, and astronomy and space clubs; short videos and reels on black-hole imaging research
Official	*"Probing the jet base of M87's supermassive black hole"* — MPIfR; EHT.
Media	*"3,000-light-year-long jet offers new clues to first black hole ever imaged"* — Scientific American.
Media	*"Aktive Galaxien: Spurensuche am Schwarzen Loch"* — Spektrum der Wissenschaft.

References

Prof. Dr. J. Anton Zensus
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