

Research Area: Low-dimensional topology, Combinatorial group theory

Research Interests

Knots and its ramifications, namely, virtual knots, welded knots, knotoids
Braid groups and its geometric generalizations, namely, virtual braid groups, welded braid groups, twin groups, singular braid monoids/groups
Algebraic solutions of Yang–Baxter equation: Quandles, Skew-left braces

Current Academic Position

May 2026 – Till date **Assistant Professor**, IIT(ISM) Dhanbad, India

PhD details

Aug 2015 – Jun 2021 **Integrated PhD in Mathematics**
Institute **Indian Institute of Science Education and Research (IISER) Mohali**
Dissertation title **Algebraic Structures in Knot Theory**
PhD Guide **Dr. Mahender Singh**

Past Academic Positions

November 25, 2025 – May 2026 **Assistant Professor**, Birla Institute of Technology Mesra, India
Apr 2023 – Apr 2025 **Fulbright-Nehru Postdoctoral Fellow**, Dept. of Mathematics, University of South Florida, USA
May 2022 – Feb 2023 **Postdoctoral Fellow**, CAMGSD, Instituto Superior Técnico, University of Lisbon, Portugal
Sep 2021 – Apr 2022 **Postdoctoral Fellow**, Dept. of Mathematics, Harish-Chandra Research Institute, India

Education

Jun 28, 2021 **Ph.D. in Mathematics**, Indian Institute of Science Education and Research, (IISER) Mohali, India
Jun 28, 2021 **M.Sc. in Mathematics**, Indian Institute of Science Education and Research, (IISER) Mohali
Jun 26, 2015 **B.Sc. (Physics, Mathematics, Chemistry)**, A. S. College Khanna, Panjab University, India

Publications

Peer-reviewed

- 8 Nanda, Neha; **Singh, Manpreet**. Quasitoric representation of generalized knots, *Mediterranean Journal of Mathematics*, Accepted on Jan 2026.
- 7 **Singh, Manpreet**. Residual finiteness and profinite properties of automorphism groups of quandles, *Topology and its Applications* 373, Paper No. 109538, 15pp, 2025. DOI: 10.1016/j.topol.2025.109538
- 6 Elhamdadi, Mohamed; **Singh, Manpreet**. Twisted Yang-Baxter sets, cohomology theory, and application to knots, *International Journal of Mathematics* **36**(2025), no. 12, Paper No. 2550043, 27 pp. DOI:10.1142/S0129167X25500430
- 5 Elhamdadi, Mohamed; **Singh, Manpreet**. Bridging colorings of virtual links from virtual biquandles to biquandles, *Canadian Mathematical Bulletin*, **68**(2025), no. 3, 1011–1024. DOI:10.4153/S0008439525000281
- 4 Bardakov, Valeriy G.; Neshchadim, Mikhail V.; **Singh, Manpreet**. Virtually symmetric representations and marked Gauss diagrams, *Topology and its Applications*, **306** (2022), Paper No. 107936, 24 pp. DOI:10.1016/j.topol.2021.107936
- 3 Raundal, Hitesh; Singh, Mahender, **Singh, Manpreet**. Orderability of link quandles, *Proceedings of the Edinburgh Mathematical Society*, **64**(2021), no. 3, 620–649. DOI:10.1017/S0013091521000419
- 2 Bardakov, Valeriy G.; Singh, Mahender; **Singh, Manpreet**. Link quandles are residually finite, *Monatshefte für Mathematik*, **191** (2020), no. 4, 679–690. DOI:10.1007/s00605-019-01336-z
- 1 Bardakov, Valeriy G., Singh, Mahender, **Singh, Manpreet**. Free quandles and knot quandles are residually finite, *Proceedings of the American Mathematical Society*, **147** (2019), no.8, 3621–3633. DOI:10.1090/proc/14488

Awards, Grants & Fellowships

Fulbright-Nehru Postdoctoral Fellowship (April 2023– April 2025)

Postdoctoral fellowship, CAMGSD, Instituto Superior Técnico, Portugal (May 2022– Feb 2023)

Postdoctoral fellowship, Harish-Chandra Research Institute, India (Sep 2021– Apr 2022)

Research Fellowship for Integrated PhD, IISER Mohali (Aug 2015– Jan 2021)

Funding for Braids Reunion Workshop, ICERM, Brown University, USA (Jul 2024)

Funding for 41st Workshop in Geometric Topology, Calvin University, USA (Jun 2024)

Funding for workshop on Artin Groups and Arrangements, SLMATH, USA (Mar 2024)

DST-funded visit to Novosibirsk State University and Tomsk State University, Russia (Jun 2019)

Teaching Experience

Course Coordinator, MA105R1 (Calculus II), Birla Institute of Technology, Jan–May 2026

Course Instructor, MA24103 (Mathematics II), Birla Institute of Technology, Jan–May 2026

Teaching Associate, MTH201 (Curves and Surfaces), IISER Mohali, Aug–Nov 2017, 2018, 2020

Teaching Associate, MTH101 (Symmetry), IISER Mohali, Aug–Nov 2019

Teaching Associate, MTH102 (Analysis in one variable), IISER Mohali, Jan–Apr 2018

Tutor, Helping Sessions for MTH201 (Curves and Surfaces), IISER Mohali, Aug–Nov 2017, 2018

Teaching Associate, MTH202 (Probability and Statistics), IISER Mohali, Jan–Apr 2019, 2020

Talks & Presentations

Jun 2024 — 41st Workshop in Geometric Topology, Calvin University, USA — “Cohomology theory of twisted Yang–Baxter sets and applications to knots”

Jan 2024 — Knots and Representation Theory Webinar (online) — “Invariants of knots from biquandles and virtual biquandles”

Jan 2024 — Joint Mathematical Meetings 2024, AMS Special Session, USA — “Knot Invariants from Biquandles and Virtual Biquandles”

Dec 2023 — Knots in Washington KIW 49.96875, USA — “Knot invariants using virtual biquandles”

Sep 2023 — Geometry/Topology Seminar, University of South Florida, USA — “Residual Finiteness and Orderability of Link Quandles”

Jun 2023 — Moscow–Beijing Topology Seminar (online) — “Combinatorial properties of link quandle”

Jun–Jul 2022 — Knot Theory and Applications, Regional Mathematical Center of the Tomsk State University, Russia (online) — “Marked Gauss Diagram”

Jun 2022 — Geometry Seminar, Centro de Matemática da Universidade de Coimbra, Portugal — “Combinatorial properties of link quandles”

Jun 2022 — Algebra Seminar, Instituto Superior Técnico, Portugal — “Some properties of link quandles”

Jul 2021 — 4th International Conference on Groups and Quandles in Low–Dimensional Topology, Tomsk State University, Russia — “Some properties of link quandles”

Feb 2021 — Knots and Representation Theory, Moscow — “Algebraic structures in knot theory”

Jun–Aug 2020 — Conference on Physical Knotting, Vortices and Surgery in Nature, Novosibirsk State University, Russia — “Virtually Symmetric representations and marked Gauss diagrams”

Dec 2019 — Young Mathematicians Symposium (YoMathS), IISER Mohali — “Residual finiteness of quandles”

Jun 2019 — 2nd International Conference on Groups and Quandles in low–dimensional topology, Tomsk State University, Russia — “Residual finiteness of quandles”

Jun 2019 — VI Russian-Chinese Conference on Knot Theory and Related Topics, Novosibirsk State University, Russia — “Residual finiteness of quandles”

Oct 2018 — Cynosure, IIT Ropar, India — Poster: “Residual finiteness of quandles”

Jul 2018 — Young Topologists’ Meet, Chennai Mathematical Institute, India — “Residual finiteness of quandles”

Conferences & Workshops (Participation)

Jul 2024 — Braids Reunion Workshop, ICERM, Brown University

Jun 2024 — Trisectors Workshop 2024: Connections with Knotted Surfaces, University of Nebraska–Lincoln, USA

Mar 2024 — Hot Topics: Artin Groups and Arrangements, SLMath University of California, Berkeley, USA

Jul 2022 — Encontro Nacional Sociedade Portuguesa de Matemática (ENSPM) 2022, Tomar, Portugal

Aug 2020 — Knots Through Web (online), ICTS Bangalore

Dec 2018 — Workshop on Volume Conjecture and related topics in Knot Theory, IISER Pune

Jul 2018 — Young Topologists' Meet, CMI, Chennai

Dec 2017 — Groups and Related Structures, IISER Mohali

Dec 2017 — 7th East Asian Conference on Algebraic Topology, IISER Mohali

Skills

Python, MATLAB, GAP, SageMath, LaTeX, LibreOffice