RAGINI SINGHAL

Curriculum Vitae
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Employment

Oct 2024-2027	Postdoctoral researcher, **University of Münster** Mentor - Hans-Joachim Hein
Sep 2023-2024	Research associate, **Université Libre de Bruxelles** Mentor - Joel Fine
March-July 2023	Visiting researcher, **Humboldt-Universität zu Berlin** Mentor - Thomas Walpuski
Nov 2021-2022	Research Associate, **King's College London** (funded by the Simons Collaboration on Special Holonomy). Mentor - Simon Salamon

Education

2017-2021	Ph.D. in Mathematics, **University of Waterloo**, Waterloo, Canada. Advisors - Benoit Charbonneau Spiro Karigiannis
2015-2016	M.Sc. in Pure Mathematics, **Imperial College London, UK**. M.Sc. Thesis - Stable minimal cones in Euclidean space. M.Sc. Thesis Advisor - André Arroja Neves
2011-2015	BS in Mathematics, **Indian Institute of Technology, Kanpur**, India. Undergraduate Thesis - Application of knot theory to detect chirality of molecules. Undergraduate Thesis Advisor - Aparna Dar

Research Interests

Riemannian geometry, Geometric analysis, Gauge theory, Deformation theory, Metrics with special holonomy.

Preprints

(1) S. Salamon and R. Singhal Revisiting 3-Sasakian and G_2-structures arXiv

Publications

(3) R. Singhal, *Nearly half-flat structures on* $S^3 \times S^3$, accepted **Differential Geometry and its Applications 97** arXiv:2310.11233, Journal.

(2) R. Singhal, *Deformations of* G_2 *instantons on nearly* G_2 *manifolds*, **Annals of Global Analysis and Geometry** 62, pages 329–366 (2022) arXiv:2101.02151, Journal.

(1) S. Dwivedi and R. Singhal, *Deformation theory of nearly* G_2 *manifolds*, **Communications in Analysis and Geometry** Volume 31 Number 3 2023, arXiv:2007.02497, Journal.

In preparation articles

(4) S. Salamon, R. Singhal, *SO(4)-invariant nearly parallel* G_2*-structures on Berger Space.*

(3) B. Charbonneau, D. Harland, R. Singhal, *Higher order degormations of instantons on 6-dim Nearly Kähler and Nearly* G_2*-manifolds.*

(2) J. Fine, P. Ghosh, R. Singhal, *Seiberg–Witten equations on Spin(7)-manifolds*

(1) S. Dwivedi and R. Singhal, *Einstein metrics on Spin(7)-manifolds.*

Invited Short-Term Visits

March-June 2024	CRM-Simons Research Visitor, **CRM, Montreal, Canada**
May-June 2014	Summer Research Visitor, **Simon Fraser University, Canada**
May-July 2013	Fellow, Student Research Fellowship Program 2013, **Indian Statistical Institute, New Delhi, India**

Invited Talks

- "Cohomogeneity-one nearly G_2-structures" , Forschungsseminar über Differentialgeometrie, 6 January 2025, University of Hamburg, Germany. gm
- "Nearly half-flat structures on $S^3 \times S^3$, Mathematisches Seminar, 17 December 2024, University of Kiel, Germany.
- "Deformation theory of nearly G_2-instantons" Geometric Models of Matter 2024, 21 August 2024, Leeds University, UK.
- "Cohomogeneity-one nearly G_2-structures" Special geometries in Dimension 6,7,8, 26th April 2024, CRM Montreal
- "Deformation theory of G_2-structures and instantons", Young Scholar day, 20 December 2023, Belgian Math Society.
- "Nearly half-flat structures on $S^3 \times S^3$", Oberseminar, November 27, 2023, Universität Münster.
- "Deformation theory of nearly G_2 manifolds", ULB Differential Geometry Seminar, May 2, 2023, Université Libre de Bruxelles.
- "Deformations of G_2 instantons on nearly G_2 manifolds", Oxford-London Gauge assembly, November 11, 2022 (online).
- "Deformations of G_2 instantons on nearly G_2 manifolds", Leeds geometry seminar, September 21 2022, University of Leeds.
- "Deformations of G_2 instantons on nearly G_2 manifolds", UCL geometry seminar, February 16 2022, UCL.
- "Deformations of G_2 instantons on nearly G_2 manifolds", Simons collaboration workshop "Connections between String Theory and Special Holonomy", January 10-14 2022, Oxford.
- "Deformation theory of nearly G_2 manifolds", Differential Geometry Seminar 2020-2021, UC Santa Barbara.
- "Deformation of instantons on nearly G_2 manifolds", AMS Fall Eastern Virtual Sectional meeting, 2020.
- "Deformation of instantons on nearly G_2 manifolds", Ottawa Mathematics Conference 2020, Ottawa.
- "Deformation theory of nearly G_2 manifolds", KCL/UCL Junior Geometry Seminar, 2020.
- "Deformation of instantons on nearly G_2 manifolds" **IIT Kanpur, India**; 11/11/2019
- "Deformations of G_2 instantons on nearly G_2 manifolds", G_2 geometry and related topics, **CMO-BIRS, Oaxaca, Mexico**; 07/05/2019
- "Minimal and Willmore surfaces", Graduate Student Colloquium, **University of Waterloo**, Canada; 26/03/2019

Talks in Seminars

- 2021 February - Talk on six dimensional nearly Kähler manifolds of cohomogeneity one, Geometry Working Seminar, University of Waterloo.
- 2021 January - Talk on new G_2-holonomy cones and exotic nearly K "ahler structures on S^6 and $S^3 \times S^3$, Geometry Working Seminar, University of Waterloo.
- 2020 January - Talk on the deformation theory of nearly G_2 manifolds, Geometry Working Seminar, University of Waterloo.
- 2019 June - Series of talks on "Self-dual Yang–Mills connections on non-self-dual 4-manifolds", Geometry Working Seminar, University of Waterloo.
- 2019 March - Series of talks on "Deformation of nearly G_2 instantons", Geometry Working Seminar, University of Waterloo.
- 2018 September - Stability and isolation phenomena for Yang–Mills fields, Geometry Working Seminar, University of Waterloo
- 2018 April - Series of talks on "$SU(2)^2$ invariant G_2 instantons", Geometry Working Seminar, University of Waterloo.
- 2017 September - Stability of minimal cones in Euclidean space, Geometry Working Seminar, University of Waterloo.

Honours and Awards

• 2023	CRM-Simons Scholar at Centre de Researches Mathématiques, March-June 2024.
• 2021	Doctoral Thesis Completion Award, University of Waterloo, Canada
• 2019	Graduate Studies Research Travel, University of Waterloo, Canada
• 2017-present	Graduate Research Scholarship, University of Waterloo, Waterloo, Canada
• 2017-present	International Doctoral Student Award, University of Waterloo, Canada
• 2017-present	Provost Doctoral Entrance Award for Women, University of Waterloo, Canada
• 2015-2016	Imperial India Foundation Scholarship, Imperial College London,UK
• 2013	Summer Research Fellowship, Indian Academy of Sciences/ Indian National Science Academy/National Academy of Sciences, India
• 2011-2015	Kishor Vaigyanik Protsahan Yojana (KVPY) scholarship, Indian Academy of Sciences, Government of India

Teaching

Instructor & Coordinator

Spring 2020	MATH 117 - Calculus I for Engineers

Teaching Assistant

Winter 2021	PMATH 450/650 Lebesgue integration and Fourier analysis
	PMATH 365/465 Differential geometry
Fall 2020	PMATH 331 Applied Real Analysis
	MATH 127 Calculus 1 for the Sciences
Winter 2020	PMATH 450/650 Lebesgue integration and Fourier analysis
	MATH 235 Linear Algebra (tutorial center)
Fall 2019	PMATH 365/465 Differential geometry
	MMT 647 Foundations of Calculus I
Spring 2019	PMATH 321 Non Euclidean geometry
	PMATH 351 Real Analysis
Winter 2019	PMATH 333 Introduction to real analysis
	MATH 118 Calculus 2 for Engineering
Fall 2018	MATH 235 Linear Algebra
	PMATH 331 Applied real analysis
Spring 2018	MMT 648 Foundations of Calculus II
Winter 2018	PMATH 365/465 Differential geometry

Fall 2017	MATH 235 Linear Algebra PMATH 365/465 Differential geometry MATH 147 Calculus I (Advanced level)

Conference and Workshop participation

- Special Holonomy: Progress and Open Problems 2022, 11-14 Sep 2022, Simons Center, Stony Brook University. (Organizer: Robert Bryant)
- Sixth Annual Meeting, 8-9 Sep 2022, Simons Foundation, NY.
- Geometry, Topology and Singular Special Holonomy Spaces, 6-10 June 2022, Freiburg University (Freiburg, Germany).
- Workshop on special geometries and gauge theory, originally scheduled for Universite de Bretagne Occidentale, France, 2020 (moved to online).
- CMS Winter meeting, Toronto, Canada; 2019.
- British Isles Graduate Workshop on Gauge theory in higher dimensions, Jersey, UK; 2019.
- Special Holonomy and Calibrated Geometry, Imperial College, London, UK; 2019
- Séminaire de Mathématiques Supérieures 2018: Derived Geometry and Higher Categorical Structures in Geometry and Physics, Fields Institute, Canada; 2018
- Geometry and Physics Conference, Fields Institute, Canada; 2017
- Workshop on Mean Curvature Flow and Ricci Flow, Fields Institute, Canada; 2017
- Minischool on Mean Curvature Flow and Ricci Flow, Fields Institute, Toronto, Canada; 2017
- Workshop on General Relativity & AdS/CFT, Fields Institute, Toronto, Canada; 2017
- Mini-School and Conference on G_2 manifolds, Fields Institute, Toronto, Canada; 2017
- Summer School in Geometric Analysis, Fields Institute, Toronto, Canada; 2017
- RTG Workshop on the Geometry and Physics of Higgs Bundles II, November 11-12, University of Illinois at Chicago; 2017
- Conference in Differential Geometry, LeBrun Fest 2016, 5-9 July, Centre de Recherches Mathematiques, Canada; 2016
- Warwick Imperial Autumn Meeting, 28 November, University of Warwick, UK; 2015

Services

- Referee, Journal of Differential Geometry (International press).
- Referee, Quarterly Journal of Mathematics (Oxford University Press).
- Organizer, Workshop: Special Riemannian metrics in dimensions 6,7,8, Centre de Recherches Mathématiques, Montreal, 22-26 April 2024.
- Organizer, British Isles Graduate Workshop, Inverness, 3-7 July 2023.
- Organizer, Junior Special Geometers Meeting, King's College London, 6-8 January 2022.
- Volunteer, Mathematica Centrum Contest tutor, K-W Bilingual School, Waterloo.
- Judge, Science Fair, K-W Bilingual School, Waterloo.
- Co-organizer, Pure Mathematics Graduate Student Colloquium, University of Waterloo.
- Graduate Volunteer, The Great Polytope Barn-Raising Project, University of Waterloo. Trained and coordinated undergraduate volunteers in building a model of a 4D-polytope.
- Grader, CEMC Math contest, University of Waterloo.

References

- Joel Fine, Université Libre de Bruxelles, (joel.fine@ulb.be)
- Simon Salamon, King's College London, (simon.salamon@kcl.ac.uk)
- Derek Harland, University of Leeds, (d.g.harland@leeds.ac.uk)
- Benoit Charbonneau, University of Waterloo (bcharbon@uwaterloo.ca)
- Spiro Karigiannis, University of Waterloo (karigiannis@uwaterloo.ca)