

# RAGINI SINGHAL

Curriculum Vitae

February 7, 2023

Department of Mathematics  
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## Employment

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Nov 2021-2022      Research Associate, **King's College London**  
(funded by the [Simons Collaboration on Special Holonomy](#)).  
Mentor - [Simon Salamon](#)

## Education

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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

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

## Published Articles

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- (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](#).
- (1) S. Dwivedi and R. Singhal, *Deformation theory of nearly  $G_2$  manifolds*, to appear in **Communications in Analysis and Geometry**, [arXiv:2007.02497](#).

## Invited Short-Term Visits

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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

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- "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 Kähler 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

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| • 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

Fall 2020	PMATH 365/465 Differential geometry PMATH 331 Applied Real Analysis
Winter 2020	MATH 127 Calculus 1 for the Sciences PMATH 450/650 Lebesgue integration and Fourier analysis
Fall 2019	MATH 235 Linear Algebra (tutorial center) PMATH 365/465 Differential geometry
Spring 2019	MMT 647 Foundations of Calculus I PMATH 321 Non Euclidean geometry
Winter 2019	PMATH 351 Real Analysis PMATH 333 Introduction to real analysis
Fall 2018	MATH 118 Calculus 2 for Engineering MATH 235 Linear Algebra
Spring 2018	PMATH 331 Applied real analysis MMT 648 Foundations of Calculus II
Winter 2018	PMATH 365/465 Differential geometry MATH 235 Linear Algebra
Fall 2017	PMATH 365/465 Differential geometry MATH 147 Calculus I (Advanced level)

## Conference and Workshop participation

- 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 Mathématiques, Canada; 2016
- Warwick Imperial Autumn Meeting, 28 November, University of Warwick, UK; 2015

## Services

- Organizer, Workshop: Special Riemannian metrics in dimensions 6,7,8, Centre de Recherches Mathématiques, Montreal, 22-26 April 2024.
- 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.