Raj Gandhi

Curriculum vitae

150 Louis-Pasteur Private, Ottawa, ON
K1N 9A7
Canada
✉ *rgand037@uottawa.ca*

Research interests

Representation theory, algebraic geometry.

Education

Sep. 2019 - Aug. 2021 **M.Sc. in Mathematics**, *University of Ottawa*.
Thesis title: *TBA*.
Supervisors: Alistair Savage and Kirill Zainoulline.

2015–2019 **B.Sc. in Physics-Mathematics**, *University of Ottawa*.
(CGPA = 9.65/10.)

Awards/Scholarships

Awards

2015–2019 **Dean's honour list**, *University of Ottawa*.

2018 **Student paper award**,
Department of mathematics and statistics, University of Ottawa, ($500).
(Awarded for paper titled *Decomposing Frobenius Heisenberg categories*.)

External scholarships

2020 **Ontario graduate scholarship**, *Ontario government*, ($15,000).
(Awarded for Sep. 2020 - Aug. 2021 session.) - Accepted

2019 **Canada graduate scholarship - M.Sc.**, *NSERC*, ($17,500).
(Awarded for Sep. 2019 - Aug. 2020 session.) - Accepted

2019 **Ontario graduate scholarship**, *Ontario government*, ($15,000).
(Awarded for Sep. 2019 - Aug. 2020 session.) - Declined

2019 **Undergraduate student research award**, *NSERC*, ($4,500).

2018 **Undergraduate student research award**, *NSERC*, ($4,500).

2017 **Undergraduate student research award**, *NSERC*, ($4,500).

Internal scholarships

2019 **Excellence scholarship - M.Sc.**, *University of Ottawa*, ($5,000).
(Awarded for Sep. 2019 - Aug. 2020 session.)

2016 **Undergraduate research opportunity program**, *University of Ottawa*, ($1,000).

2015 **Admission scholarship - B.Sc.**, *University of Ottawa*, ($16,000).

Experience

Research experience

May–Aug. 2019 **Undergraduate student researcher**, *Carleton University*, Ottawa.
Project title: *Rigid realizations of modular forms in Calabi-Yau threefolds*.
Supervisors: Colin Ingalls and Adam Logan.
Summary:
- Wrote code to count points on quotients of various modular Calabi-Yau threefolds by automorphisms of order 2. Verified modularity of many examples, and found three new rigid quotients of nonrigid Calabi-Yau threefolds.

May–Aug. 2018 **Undergraduate student researcher**, *University of Ottawa*.
Project title: *Decomposing Frobenius Heisenberg categories*.
Supervisor: Alistair Savage.
Summary:
- Proved two new presentations of the Frobenius Heisenberg category of the paper *Frobenius Heisenberg categorification* of Savage, in a special case;
- Used a new presentation to show an equivalence between the Frobenius Heisenberg category and its partial Karoubi envelope, in the special case.

May–Aug. 2017 **Undergraduate student researcher**, *University of Ottawa*.
Project title: *The Demazure submodule and dihedral groups*.
Supervisor: Kirill Zainoulline.
Summary:
- Generalized the formal affine Demazure algebra of the paper *Formal Hecke algebras and algebraic oriented cohomology theories* of Hoffnung, Malagón-López, Savage, Zainoulline to dihedral groups;
- Found formulas for several structure coefficients appearing in braid relations among generators of the generalized formal affine Demazure algebra for all dihedral groups;
- Computed all structure coefficients for dihedral groups $I_2(5)$ and $I_2(7)$.

Teaching experience

2019-2020 **Teaching assistant**, *University of Ottawa*.
- MAT 1320: Calculus I (Winter 2020).
- MAT 1348: Discrete Mathematics for Computing (Winter 2020).
- MAT 1362: Mathematical Reasoning and Proofs (Winter 2020).
- MAT 1362: Mathematical Reasoning and Proofs (Fall 2019).

Presentations

Aug. 2018 **Student summer seminar**, *University of Ottawa*.
Title of talk: *The Heisenberg category.*
Description: We introduced monoidal categories, string diagrams, and the Khovanov categorification of the Heisenberg algebra.

Aug. 2017 **Summer student seminar**, *University of Ottawa*.
Title of talk: *Twisted formal group algebras.*
Description: We introduced the twisted formal Demazure algebra for arbitrary finite reflection groups, specialize to dihedral groups, and describe some relations among generators of a subalgebra that we call the *Demazure submodule*.

Mar. 2017 **UROP symposium**, *University of Ottawa*.
Title of talk: *Twisted differential operators for dihedral group* $I_2(5)$.
Description: We presented a poster prepared in LaTeXat the University of Ottawa UROP symposium. The poster covered finite reflection groups, the symmetries of a pentagon, and finally described some new relations between generators of the Demazure submodule of dihedral group $I_2(5)$.

Sep. 2016 **Junior algebra seminar**, *University of Ottawa*.
Title of talk: *Introduction to finite reflection groups.*
Description: We presented a summary of the first chapter of James Humphreys' book, *Reflection groups and Coxeter groups*.

Invited Talks

2021 **CMS Summer Meeting: Session on Algebraic and Geometric Theory of Homogeneous Spaces.**, (Postponed to 2021 due to COVID-19 concerns).
University of Ottawa, *The Demazure submodule and dihedral groups.*

Skills

Language skills

English: fluent.

French: basic.

Gujarati: basic.

Computer skills

Proficient: Microsoft office.

Intermediate knowledge: C, LaTeX, Magma, Maple, Matlab, Python.

Papers

Published/Accepted

1. Decomposing Frobenius Heisenberg categories, *Journal of Algebra and its Applications*, to appear in 2020. DOI. Preprint.

Submitted

2. The Demazure submodule and dihedral groups. Submitted to *Communications in Algebra*. Preprint.