

Rahim Nazim Moosa

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Waterloo, Ontario, N2L 3G1 (519) 888-4567 ext. 42453 rmoosa@uwaterloo.ca

Research interests: Logic (model theory), interactions with algebra and geometry.

Education

Ph.D. in Mathematics University of Illinois at Urbana-Champaign, 2001
Thesis: *Contributions to the Model Theory of Fields and Compact Complex Spaces*
Advisor: Anand Pillay

B.ArtsSc. (Hons.) McMaster University, 1996

Academic Positions

Faculty of Math Research Chair University of Waterloo *Jan. 2023 – present*

Professor University of Waterloo *July 2015 – present*

Associate Professor University of Waterloo *July 2009 – June 2015*

Assistant Professor University of Waterloo *July 2004 – June 2009*

CLE Moore Instructor MIT *July 2002 – June 2004*

NSERC Postdoctoral Fellow Fields Institute *July 2001 – June 2002*

Visiting Assistant Professor UC Berkeley *August 2001 – May 2002*

Visiting Positions

Visiting Researcher Fields Institute, Toronto *July–December 2021*

CARMIN Visiting Researcher IHES and IHP, Paris *January–July 2018*

Member MSRI, Berkeley *January–May 2014*

Scientific Member Max Planck Institute, Bonn, Germany *April–June 2012*

Programme Participant Isaac Newton Inst., Cambridge, UK *May–July 2005*

Editorial and Review Positions

ERC Advanced Grant Evaluation Panel Member (PE1)	2023
Founding Editor-in-Chief <i>Model Theory</i>	2021 –
Associate Editor <i>Canadian Journal of Math, Canadian Math Bulletin</i>	2021 –
Reviews Editor <i>The Bulletin of Symbolic Logic</i>	2011 – 2021

Individual Grants Awarded

Faculty of Math Research Chair \$150,000	2023–2026
NSERC Discovery Grants	2005– present
Current: \$135,000 (2021–2026)	
Past: \$100,000 (2015–2021), \$120,000 (2010–2015), \$80,000 (2005–2010)	
NSERC Discovery Accelerator Supplement \$120,000	2015–2018

Fields Institute Grants Awarded

Model theory, algebraic dynamics, and differential-algebraic geometry , Workshop with J. Bell, A Padgett	\$40,000 <i>Scheduled for June 2025</i>
Trends in Pure and Applied Model Theory Thematic Programme with D. Haskell, F. Loeser, D. Marker, T. Scanlon, C. Terry	\$450,000 <i>July–Dec. 2021</i>
Recent applications of model theory , Workshop with J. Bell, Z. Chatzidakis, M. Kamensky	\$15,000 <i>July 2019</i>
Differential Galois theory and differential algebraic groups , Workshop with A. Pillay and M. Wibmer	\$20,000 <i>July 2017</i>
Interactions between model theory and arithmetic dynamics , Workshop with J. Bell and Z. Chatzidakis	\$15,000 <i>July 2016</i>

Articles Under Review

47. Binding groups for algebraic dynamics (with M. Kamensky)
Submitted, 40pp.

46. Six lectures on model theory and differential-algebraic geometry
Submitted, 21pp.

Refereed Publications

45. Differential-algebraic permutation groups
(with J. Freitag and L. Jimenez) To appear in
Journal de l'Institut de Mathématiques de Jussieu, 22pp.

44. On invariant rational functions under rational transformations
(with J. Bell and M. Satriano) To appear in
Selecta Mathematica, 20pp.

43. Abelian reduction in differential-algebraic and bimeromorphic geometry
(with R. Jaoui) To appear in
Annales de l'Institut Fourier, 32pp.

42. Effective isotrivial Mordell-Lang in positive characteristic
(with J. Bell and D. Ghioca) To appear in
American Journal of Mathematics, 42pp.

41. Bounding nonminimality and a conjecture of Borovik-Cherlin
(with J. Freitag) To appear in
Journal of the European Mathematical Society, 22pp.

40. Model theory and the DME: a survey. To appear in
Research Trends in Contemporary Logic (Eds M. Fitting et al), 17pp.

39. A model theory for meromorphic vector fields
Model Theory (Special issue dedicated to Boris Zilber) 3(2):259–283, 2024.

38. The degree of nonminimality is at most two (with J. Freitag and R. Jaoui)
Journal of Mathematical Logic 23(3), Paper No. 2250031, 6pp., 2023.

37. Commutative bidifferential algebra (with O. Leon Sanchez)
Journal of Algebra, 609: 764–791, 2022.

36. When any three solutions are independent (with J. Freitag and R. Jaoui)
Inventiones Mathematicae doi.org/10.1007/s00222-022-01143-8, 13pp., 2022.

35. Invariant hypersurfaces (with J. Bell and A. Topaz)
Journal de l'Institut de Mathématiques de Jussieu, 21 (2): 713–739, 2022.

34. Internality of logarithmic-differential pullbacks (with R. Jin)
Transactions of the American Mathematical Society, 373 (7):4863–4887, 2020.
33. F -sets and finite automata (with J. Bell)
Journal de Théorie des Nombres de Bordeaux, 31 (1):101–130, 2019.
32. Isolated types of finite rank: an abstract Dixmier-Moeglin equivalence
(with O. León Sánchez)
Selecta Mathematica, 25 (1), Paper No. 10, 10pp., 2019.
31. Functoriality and uniformity in Hrushovski’s groupoid-cover correspondence
(with L. Haykazyan)
Annals of Pure and Applied Logic, 169 (8):715–730, 2018.
30. D -groups and the Dixmier-Moeglin equivalence (with J. Bell and O. León Sánchez)
Algebra & Number Theory, 12 (2):343–378, 2018.
29. Finiteness theorems on hypersurfaces in partial differential-algebraic geometry
(with J. Freitag)
Advances in Mathematics, 314:726–755, 2017.
28. Model theory of compact complex manifolds with an automorphism
(with M. Bays and M. Hils)
Transactions of the American Mathematical Society, 369(6):4485–4516, 2017.
27. Poisson algebras via model theory and differential-algebraic geometry
(with J. Bell, S. Launois, and O. Leon Sanchez)
Journal of the European Mathematical Society, 19(7):2019–2049, 2017.
26. The model companion of differential fields with free operators
(with O. Leon Sanchez)
Journal of Symbolic Logic, 81(2):493–509, 2016.
25. Differential-algebraic jet spaces preserve internality to the constants
(with Z. Chatzidakis and M. Harrison-Trainor)
Journal of Symbolic Logic, 80(3):1022–1034, 2015.
24. A note on subvarieties of powers of OT-manifolds (with M. Toma)
Bulletin de la Société des Sciences Mathématiques de Roumanie, 58(3):311–316, 2015.
23. Model theory of fields with free operators in characteristic 0
(with T. Scanlon)
Journal of Mathematical Logic, 14(2), 1450009, 43pp., 2014.
22. Some model theory of fibrations and algebraic reductions (with A. Pillay)
Selecta Mathematica, 20(4):1067–1082, 2014.

21. Countably categorical strongly minimal compact complex manifolds
(with A. Pillay)
Proceedings of the American Mathematical Society, 140(5):1785–1801, 2012.
20. Nonstandard methods for bounds in differential polynomial rings
(with M. Harrison-Trainor and J. Klys)
Journal of Algebra, 360:71–86, 2012.
19. A model-theoretic counterpart to Moishezon morphisms
Models, Logics and Higher-Dimensional Categories, (Eds. B. Hart et al)
CRM Proceedings and Lecture Notes, AMS, 53:177–188, 2011.
18. Generalised Hasse-Schmidt varieties and their jet spaces (with T. Scanlon)
Proceedings of the London Math. Society, 103(2):197–234, 2011.
17. Model theory and complex geometry (Feature article, invited submission)
Notices of the American Mathematical Society, 57(2):230–235, 2010.
16. Jet and prolongation spaces (with T. Scanlon)
Journal de l'Institut de Mathématiques de Jussieu, 9(2):391–431, 2010.
15. On canonical bases and internality criteria (with A. Pillay)
Illinois Journal of Mathematics, 52(3):901–917, 2008.
14. An essentially saturated surface not of Kähler-type
(with R. Moraru and M. Toma)
Bulletin of the London Mathematical Society, 40(5):845–854, 2008.
13. Differential arcs and regular types in differential fields
(with A. Pillay and T. Scanlon)
Journal für die reine und angewandte Mathematik, 620:35–54, 2008.
12. K -analytic vs CCM-analytic sets in nonstandard compact complex manifolds
(with S. Starchenko)
Fundamenta Mathematicae, 198(2):139–148, 2008.
11. Model Theory and Kähler Geometry (with A. Pillay)
Model Theory with Applications to Algebra and Analysis Vol. 1
(Eds. Z. Chatzidakis et al), Cambridge University Press, 167–195, 2008.
10. Stable definability and generic relations (with B. Kim)
Journal of Symbolic Logic, 72(4):1163–1176, 2007.
9. Division points on subvarieties of isotrivial semiabelian varieties (with D. Ghioca)
International Mathematics Research Notices, Article ID 65437, 23pp., 2006.
8. Strongly minimal groups in the theory of compact complex spaces
(with M. Aschenbrenner and T. Scanlon)
Journal of Symbolic Logic, 71(2):529–552, 2006.

7. On saturation and the model theory of compact Kähler manifolds
Journal für die reine und angewandte Mathematik, 586:1–20, 2005.
6. The model theory of compact complex spaces.
Logic Colloquium '01 (Eds. M. Baaz et al)
Association for Symbolic Logic, 317–349, 2005.
5. A nonstandard Riemann existence theorem
Transactions of the American Mathematical Society, 356(5):1781–1797, 2004.
4. F -structures and integral points on semi-abelian varieties over finite fields
(with T. Scanlon)
American Journal of Mathematics, 126(3):473–522, 2004.
3. The Mordell-Lang conjecture in positive characteristic revisited
(with T. Scanlon)
Model Theory and Applications (Eds. L. Bélair et al),
Seconda Università di Napoli, 275–296, 2002.
2. On difference fields with quantifier elimination
Bulletin of the London Mathematical Society, 33(6):641–646, 2001.
1. A note on uniform definability and minimal fields of definition
Journal of Symbolic Logic, 65(2):817–821, 2000.

Invited Participation at **Institute Workshops**

Fields Institute Toronto

Trends in Pure and Applied Model Theory

July 1 – December 31, 2021

Institut Henry Poincaré Paris, France

Model Theory and Applications

March 26–30, 2018

Luminy CIRM, France

Alg., Arith. and Comb. of Difference/Differential Equations *May 28–June 1, 2018*

Model Theory, Difference/Differential Equations and Applications *April 7–10, 2015*

The Geometry of the Frobenius Automorphism

March 25–29, 2013

MODNET workshop on Model Theory of Fields

November 12–16, 2007

Oberwolfach Mathematisches Forschungsinstitut, Germany

Model Theory: groups, geometries and combinatorics

January 2020

Model Theory: groups, geometry, and combinatorics

January 3–9, 2016

Around Valued Fields and Dependent Theories

January 3–9, 2010

Model Theory and Groups

January 14–20, 2007

Model Theory and Complex Analytic Geometry

July 18–24, 2004

Durham Symposium London Math. Society, United Kingdom

New Directions in the Model Theory of Fields

July 20–30, 2009

BIRS Alberta

Alg. Dynamics and Difference/Differential Eqns

November 14–19, 2021

Stability Theoretic Methods in Unstable Theories

February 8–13, 2009

Interactions between Model Theory and Geometry

March 13–18, 2004

Invited in-person **Talks** of the last six years

- Geometry from the model theorist's perspective** *September 2024*
Oxford University, United Kingdom
 “Quantifier-free binding groups in ACFA”
- Logic at Maryland** *August 2024*
University of Maryland, College Park
 “Quantifier-free binding groups in ACFA”
- Ontario Graduate Mathematics Conference, Plenary Speaker** *June 2024*
University of Waterloo
 “Model theory and algebraic differential equations”
- CMS Annual Meeting, Saskatoon** *June 2024*
 Mathematical logic in Canada, Special Session
 “Primitive permutation groups in differentially closed fields”
- Model Theory Conference** *September 2023*
Wroclaw, Poland
 “Bounding nonorthogonality”
- Model Theory and Related Topics** *July 2023*
Manchester University, United Kingdom
 “Invariant rational functions and translation varieties”
- Hebrew University Logic Seminar** *May 2023*
Jerusalem, Israel
 “Bounding nonorthogonality”
- Math Departmental Colloquium** *May 2023*
Ben Gurion University, Israel
 “Recent applications of model theory to algebraic vector fields I, II, III”
- Math Departmental Colloquium** *April 2023*
University of Notre Dame, Indiana
 “Recent applications of model theory to algebraic vector fields”
- McMaster Logic Seminar** *January 2023*
 “Degree of nonminimality is at most two”
- Joint Math. Meetings, Boston** *January 2023*
 Definability, Computability, and Model Theory, Special Session
 “Two recent application of the model theory of differentially closed fields”
- Model Theory Conference** *December 2022*
Będlewo, Poland
 “Degree of nonminimality is at most two”

- Practical and Structural Model Theory** *July 2022*
Leeds University, United Kingdom
 “Abelian reduction and internality to the constants”
- Manchester Logic Seminar** *July 2022*
 “Degree of nonminimality is at most two”
- Alg. Dynamics and Difference/Differential Eqns** *November 2021*
BIRS, Alberta
 “Bidifferential algebraic geometry”
- Trends in Pure and Applied Model Theory** *October 2021*
Fields Institute, Toronto
 “When any three solutions are independent”
- Interactions between Representation Theory and Model Theory** *July 2019*
University of Kent, United Kingdom
 “Model theory and the DME”
- Manchester Logic Seminar** *July 2019*
 “Pullbacks under the log derivative”
- Connections between Model Theory, Differential and Difference algebra, and their Applications** *March 2019*
CUNY, New York
 “Pullbacks under the log derivative”
- Pure and Applied Model Theory** *October 2018*
University of Illinois at Chicago
 “Around Jouanolou-type Theorems”
- Lyon Logic Seminar** *June 2018*
 “The groupoid-cover correspondence revisited”
- Groupe d’Etude sur les Problèmes Diophantiens** *June 2018*
Jussieu, Paris
 “Isotrivial Mordell-Lang and finite automata”
- Algebra, Arith. and Combinatorics of Difference/Differential Equations** *May 2018*
CIRM, Luminy, France
 “Around Jouanolou-type Theorems”
- Géométrie et Théorie des Modèles** *May 2018*
Institut Henri Poincaré, Paris
 “Isotrivial Mordell-Lang and finite automata”

Supervisory Experience

Post-doctoral

Nicolas Chavarria Gomez	2023–
Chris Shultz (co-supervisor)	2023–
Léo Jimenez	2021–2023
Dino Rosseger (co-supervisor)	2019–2021
Simon Crawford (co-supervisor)	2018–2020
Rémi Jaoui	2017–2019
Levon Haykazyan	2016–2019
Yi Zhu (co-supervisor)	2015–2017
Jonathon Stephenson (co-supervisor)	2015–2017
Alex Wires (co-supervisor)	2013–2015
Pantelis Eleftheriou	2011–2013
Javier Moreno	2011
Bernie Anderson (co-supervisor)	2009–2011
Moshe Kamensky	2007–2009

Doctoral

Fateme Peimany	2024–
Christine Eagles	2022–
Christopher Hawthorne	2017–2021
Thesis: <i>A guide to F-automatic sets</i>	
Ruizhang Jin ¹	2013–2019
Thesis: <i>The Log Derivative and Model-Theoretic Analysability in DCF</i>	
Omar León Sánchez ²	2008–2013
Thesis: <i>Contributions to the model theory of partial differential fields</i>	

Masters

Andrew Feng	2023–2024
Jenny Xu	2022–2023
Vincent Boldt	2022–2023
Christine Eagles	2020–2021
Marco Handa	2019–2020
Wilson Poulter	2018–2019
Hussein Ahmed (co-supervisor)	2017–2018
Christopher Hawthorne	2015–2016
Ruizhang Jin	2012–2013
Daniel Ivan	2011–2012
Allen O’Hara	2010–2011
Chris Eagle	2008–2010

¹Winner of the faculty wide 2019 Huawei Prize for Best Research Paper

²Winner of the faculty-wide 2013 Murray Martin Prize for graduate research

Undergraduate research, NSERC (23 students)

Kareem Alfarra (Spring 2024), Lucas Tate (Spring 2024), Layth Ali Al-Hellawi (Spring 2023), Gurtaj Dhaliwal (Spring 2023), Tam An Le Quang (Spring 2023), Marin Schulz (Spring 2022), Austin Shiner (Spring 2020), Alexander Slamen (Spring 2020), Spencer Wilson (Fall 2019), Garret Hildebrandt (Spring 2019), Nicole Chassin (Spring 2016, Fall 2015), Michael Zhu (Winter 2016), Christopher Hawthorne (Spring 2013), Eeshan Wagh (Spring 2013), Yossef Musleh (Winter 2013), Chen Fei Du (Fall 2011), Matthew Harrison-Trainor³ (Spring 2010, Spring 2011), Jack Klys (Spring 2010), Oleg Chterental (Winter 2009), Richard Zsolt (Spring 2008), Elliot Lipnowski (Winter 2008), Wilson Kan (Spring 2006)

Undergraduate research, Other (7 students)

Noah Nazareth (Fall 2024), Derek Wu (Winter 2023), Shuo (Spencer) Gao (Spring 2020), Lirong Yang (Winter 2017, Winter 2015), Alan Yeung (CUHK, Spring 2016), Li Yan Lung (CUHK, Spring 2015), Atul Sivaswamy (Spring 2009).

Doctoral Thesis Committees

Jakub Gogolok, Wrocław University (external examiner)	2024
Michael Lösch, University of Freiburg (external examiner)	2022
Léo Jimenez, Notre Dame University (external examiner)	2020
Hongdi Huang, University of Waterloo Pure Math	2020
Michael Deveau, University of Waterloo Pure Math	2019
Mohammad Mahmoud, University of Waterloo Pure Math	2019
Blake Madill, University of Waterloo Pure Math	2017
Ian Payne, University of Waterloo Pure Math	2017
Tyrone Ghaswala, University of Waterloo Pure Math	2017
Diana Castenada (oral comp examiner), University of Waterloo Pure Math	2017
Matthew Luther, McMaster University, Math & Statistics (external reader)	2015
Robert Garbary, University of Waterloo Pure Math	2015
Carolyn Knoll, University of Waterloo Pure Math	2013
Rohan Kapadia, University of Waterloo C&O (internal-external reader)	2013
James Frietag, University of Illinois at Chicago (external reader)	2012
Jean-Martin Albert, McMaster University (external reader)	2010
Dale Radin, University of Illinois at Chicago (external reader)	2004

Masters Essay/Thesis Committees

David Smith (Stellenbosch, South Africa 2024), Jake Zimmerman (2018), Chris Dugdale (2014), David Peterson (2013), Siwei Gao (2012), David Belanger (2009), Zi Yang Sham (2008), Stephanie Kleven (2006)

³Winner of the faculty-wide 2012 Jesse W.H. Zou Memorial Award for undergraduate research

Teaching at the University of Waterloo in the last 15 years

Topics in Logic: **Model theory of fields with operators** PMath 930
 Fall 2025 (Scheduled), Winter 2023 (8 students), Winter 2021 (7 students),
 Fall 2019 (5 students)

Model Theory PMath 433/733
 Winter 2025 (Scheduled)

Mathematical Logic PMath 432/632
 Fall 2024 (23 students)

Linear Algebra 1 Math 136
 Winter 2024 (212 students)

Set Theory and Model Theory PMath 433/733 (formerly 433/633)
 Fall 2022 (21 students), Fall 2020 (37 students), Fall 2018 (28 students),
 Fall 2016 (24 students), Winter 2015 (21 students), Fall 2012 (22 students),
 Fall 2010 (28 students), Fall 2008 (37 students)

Linear Algebra 2, advanced Math 245
 Fall 2022 (31 students), Fall 2020 (32 students), Fall 2019 (44 students),
 Winter 2008 (9 students)

Introduction to Commutative Algebra PMath 446/646
 Winter 2020 (21 students), Winter 2019 (30 students), Winter 2016 (18 students)

Algebra for Honours Mathematics Math 135
 Winter 2019 (57 students), Fall 2017 (38 students), Winter 2017 (63 students),
 Fall 2016 (51 students), Fall 2013 (175 students), Fall 2012 (162 students),
 Fall 2011 (172 students), Winter 2011 (88 students), Fall 2009 (143 students),
 Fall 2004 (140 students)

Groups and Rings PMath 347
 Fall 2017 (52 students), Fall 2015 (36 students)

Topics in Algebra: **Valued Fields** PMath 900
 Winter 2017 (17 students), Fall 2013 (16 students), Fall 2011 (18 students)

Topics in Logic: **Stability Theory** PMath 930 (formerly 911,711)
 Fall 2015 (9 students), Winter 2013 (9 students), Winter 2009 (12 students)

Algebraic Curves PMath 764
 Winter 2012 (22 students)

Rings, Polynomials, and Finite Fields PMath 345
 Fall 2010 (22 students), Fall 2009 (26 students)

Service

Canadian Mathematical Society, Vice-President Ontario *2015–2017*

Waterloo Committees

Departmental

Awards Committee, Colloquium Chair, Department Advisory Committee on Appointments, Graduate Admissions, Library Representative, Scholarships, Tenure and Promotions, Undergraduate Curriculum

Faculty

Awards Committee; Faculty of Arts Tenure and Promotions (Math rep); Faculty of Environment Council (Math rep); Nominating Committee for Chair; Research Advisory Committee; Working Group on Black and Indigenous Racism; Working Group on Research, Creativity, and Innovation

University

Academic Freedom and Tenure Committee, CEMC Advisory Committee on Appointments, Faculty Association Departmental Representative, Hagey Lecture Committee (Chair), PhD Defense chair pool, Tenure and Promotion Appeal Tribunal (Chair)

Conference Organising Committees of the last eight years

Workshop on Model theory, algebraic dynamics, and differential-algebraic geometry
Fields Institute *Scheduled for June 2025*

Geometric and combinatorial configurations in model theory
Freiburg, Germany *Nov 2023*

Annual Meeting of the Association for Symbolic Logic (Chair)
Irvine, California *May 2023*

Thematic Programme on Trends in Pure and Applied Model Theory
Fields Institute *July–Dec 2021*

Workshop on Model Theory of Differential Equations, Algebraic Geometry,
and their Applications to Modeling, BIRS *May 2020*

CMS Winter Meeting, Special Session, Mathematical Logic in Canada
Toronto *December 2019*

Workshop on Recent Applications of Model Theory
Fields Institute *July 2019*

Model Theory Special Session, ASL Annual Meeting
City University of New York *May 2019*

CMS Winter Meeting, Special Session, Model Theory
Waterloo *December 2017*

Workshop on Differential Galois Theory and Differential Algebraic Groups
Fields Institute *July 2017*

Workshop on Model Theory and Arithmetic Dynamics
Fields Institute *July 2016*

Reviewer AMS Mathematical Reviews

2015 –