Rahim Nazim Moosa

University of Waterloo, Department of Pure Mathematics, 200 University Ave. West
Waterloo, Ontario, N2L 3G1 (519) 888-4567 ext. 32453 Fax: (519) 725-0160

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

Professor University of Waterloo *July 2015 – present*

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

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

Member MSRI, Berkeley *January–May 2014*

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

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

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

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*

Grants Awarded

NSERC Discovery Grant $20,000 per year *2015–2020*

NSERC Discovery Accelerator Supplement $40,000 per year *2015–2018*

NSERC Discovery Grant $24,000 per year *2010–2015*

NSERC Discovery Grant $16,000 per year *2005–2010*

Research Interests

Model theory (a branch of mathematical logic).
Especially interactions with algebra and geometry.

Articles Under Review

34. *Invariant hypersurfaces* (with J. Bell and A. Topaz)
Submitted, 25 pages.

Refereed Publications

33. *F-sets and finite automata* (with J. Bell)
To appear in Journal de Théorie des Nombres de Bordeaux, 25 pages.

32. *Isolated types of finite rank: an abstract Dixmier-Moeglin equivalence*
(with O. León Sánchez)
To appear in Selecta Mathematica, 9 pages.

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 diffferential-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 zero*
(with T. Scanlon)
Journal of Mathematical Logic, 2014, doi: 10.1142/s0219061314500093. 38 pages

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*
In Models, Logics and Higher-Dimensional Categories: A Tribute to the Work of Mihály Makkai, (Eds. B. Hart et al), CRM Proceedings and Lecture Notes American Mathematical Society, 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, 23 pages, 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**

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, geometry, and combinatorics *January 3–9, 2016*
Around Valued Fields and Dependent Theories *January 3–9, 2010*
Model Theory and Groups *Janunary 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
Stability Theoretic Methods in Unstable Theories *February 8–13, 2009*
Interactions between Model Theory and Geometry *March 13–18, 2004*

Invited **Talks** of the last five years

Interactions between Representation Theory and Model Theory
University of Kent, United Kingdom *Scheduled for July 2019*

Connections between Model Theory, Differential and Difference algebra, and their Applications, CUNY, New York *Scheduled for March 2019*

Pure and Applied Model Theory, University of Illinois at Chicago *October 2018*
"Around Jouanolou-type Theorems"

Lyon Logic Seminar *June 2018*
"The groupoid-cover correspondence revisited"

Groupe d'Etude sur les Problèmes Diophantiens Paris *June 2018*
"Isotrivial Mordell-Lang and finite automata"

Algebra, Arith. and Combinatorics of Difference/Differential Equations
CIRM, Luminy, France *May 2018*
"Around Jouanolou-type Theorems"

Géometrie et Théorie des Modèles Paris *May 2018*
"Isotrivial Mordell-Lang and finite automata"

Model Theory and Applications Institut Henri Poincaré, Paris *March 2018*
"D-varieties and the Dixmier-Moeglin equivalence"

Oxford Logic Seminar *February 2018*
"Isotrivial Mordell-Lang and finite automata"

Bridges between Automatic Sequences and Algebra and Number Theory
CRM, Montreal, "F-sets, Mordell-Lang, and automaticity" *May 2017*

Joint Math. Meetings ASL Invited Address Atlanta, GA *January 2017*
"An application of model theory to noncommutative algebra"

Winter Meeting of the CMS Niagara Falls, Ontario *December 2016*
Special Session on Mathematical Logic
"An application of model theory to noncommutative algebra"

Thematic Program in Model Theory Notre Dame *June 2016*
"An application of model theory to Hopf Ore extensions"

Differential Algebra Mini-Workshop CUNY, New York *May 2016*
"The differential Dixmier-Moeglin problem"

Differential Algebra and Related Topics Beijing, China *August 2015*
"An application of model theory to Poisson algebras"

Arithmetic and algebraic differentiation MSRI, Berkeley *May 2015*
"Around Jouanolou-type theorems"

Model Theory, Difference/Differential Equations and Applications
Luminy, France *April 2015*
"Nonstandard compact complex manifolds with a generic automorphism"

Math Departmental Colloquium University of Notre Dame *March 2015*
"An application of model theory to Poisson algebras"

Joint Math. Meetings San Antonio, Texas *January 2015*
Special Session on Model Theory
"Model theory of compact complex manifolds with a generic automorphism"

Winter Meeting of the CMS Hamilton, Ontario *December 2014*
Special Session on Model Theory
"Differential fields with free operators"

Kolchin Seminar in Differential Algebra CUNY, New York *November 2014*
"Differential varieties with only algebraic images"

Supervisory Experience

Post-doctoral

Simon Crawford (co-supervisor) *2018–*
Rémi Jaoui *2017–*
Levon Haykazyan *2016–*
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

Christopher Hawthorne *2017–*
Ruizhang Jin *2013–*
Omar León Sánchez[1] *2008–2013*
Thesis: *Contributions to the model theory of partial differential fields*

Masters

Wilson Poulter *2018–*
Hussein Ahmed (co-supervisor) *2017–2018*
Essay: *Gödel's 2nd incompleteness theorem and fragments of arithmetic*
Christopher Hawthorne *2015–2016*
Essay: *Formal languages and the model theory of finitely generated free monoids*
Ruizhang Jin *2012–2013*
Essay: *Canonical bases in stable theories*
Daniel Ivan *2011–2012*
Essay: *Existentially closed Hasse fields*
Allen O'Hara *2010–2011*
Essay: *An introduction to equations and equational theories*
Chris Eagle *2008–2010*
Thesis: *The Mordell-Lang theorem from the Zilber dichotomy*

Undergraduate, NSERC

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-Trainor[2] (Spring 2010, Spring 2011), Jack Klys (Spring 2010), Oleg Chterental (Winter 2009), Richard Zsolt (Spring 2008), Elliot Lipnowski (Winter 2008), Wilson Kan (Spring 2006)

[1] Winner of the faculty-wide 2013 Murray Martin Prize for graduate research
[2] Winner of the faculty-wide 2012 Jesse W.H. Zou Memorial Award for undergraduate research

Undergraduate, Other
Lirong Yang (Winter 2017, Winter 2015), Alan Yeung (CUHK, Spring 2016)
Li Yan Lung (CUHK, Spring 2015), Atul Sivaswamy (Spring 2009).

Doctoral Thesis Committees

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

Teaching at the University of Waterloo in the last five years

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

Algebra for Honours Mathematics Math 135
Winter 2019 (current), 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

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

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)

Service

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

Waterloo Committees

Departmental

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

Faculty

Faculty Working Group on Research, Creativity, and Innovation; Nominating Committee for Chair; Research Advisory Committee

University

Faculty Association Departmental Representative, Hagey Lecture Committee

Conference Organising Committees

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

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

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

CMS Winter Meeting Special Session on 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*

Introductory Workshop (Chair), MSRI, Berkeley *February 2014*

ASL Annual Meeting, Waterloo *May 2013*

Model Theory Special Session, ASL Annual Meeting, Waterloo *May 2013*

IMNA (Chair), Max Planck Institute for Mathematics, Bonn *June 2012*

Recent Developments in Model Theory, Oléron, France *June 2011*

ASL Annual Meeting, Notre Dame *May 2009*

Model theory session of the CMS-MITACS Joint Conference, Winnipeg *June 2007*

Greater Boston Logic Conference, MIT *May 2003*

Reviews Editor The Bulletin of Symbolic Logic *2011 –*

Reviewer Mathematical Reviews *2015 –*