

Rahim Nazim Moosa

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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	<i>July 2015 – present</i>
Associate Professor University of Waterloo	<i>July 2009 – June 2015</i>
Member MSRI, Berkeley	<i>Jan–May 2014</i>
Member Max Planck Institute, Bonn, Germany	<i>April–June 2012</i>
Assistant Professor University of Waterloo	<i>July 2004 – June 2009</i>
Member Isaac Newton Institute, Cambridge, UK	<i>May–July 2005</i>
CLE Moore Instructor MIT	<i>July 2002 – June 2004</i>
NSERC Postdoctoral Fellow Fields Institute	<i>July 2001 – June 2002</i>
Visiting Assistant Professor UC Berkeley	<i>August 2001 – May 2002</i>

Grants Awarded

NSERC Discovery Grant \$20,000 per year	<i>2015–2020</i>
NSERC Discovery Accelerator Supplement \$40,000 per year	<i>2015–2018</i>
NSERC Discovery Grant \$24,000 per year	<i>2010–2015</i>
NSERC Discovery Grant \$16,000 per year	<i>2005–2010</i>

Research Interests

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

Articles Under Review

1. *D-groups and the Dixmier-Moeglin equivalence* (with J. Bell and O. León Sánchez)
Submitted 33 pages, arXiv:1612.00069.
2. *Finiteness theorems on hypersurfaces in partial differential-algebraic geometry*
(with J. Freitag)
Submitted 25 pages, arXiv:1606.08492.

Refereed Publications

3. *Model theory of compact complex manifolds with an automorphism*
(with M. Bays and M. Hils)
To appear in the Transactions of the AMS. 33 pages.
4. *Poisson algebras via model theory and differential-algebraic geometry*
(with J. Bell, S. Launois, and O. Leon Sanchez)
To appear in the Journal of the European Mathematical Society. 29 pages.
5. *The model companion of differential fields with free operators*
(with O. Leon Sanchez)
Journal of Symbolic Logic, 81(2):493–509, 2016.
6. *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.
7. *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.
8. *Model theory of fields with free operators in characteristic zero*
(with T. Scanlon)
Journal of Mathematical Logic, 2014, doi: 10.1142/s0219061314500093. 38 pages
9. *Some model theory of fibrations and algebraic reductions* (with A. Pillay)
Selecta Mathematica, 20(4):1067–1082, 2014

10. *Countably categorical strongly minimal compact complex manifolds*
(with A. Pillay)
Proceedings of the American Mathematical Society, 140(5):1785–1801, 2012
11. *Nonstandard methods for bounds in differential polynomial rings*
(with M. Harrison-Trainor and J. Klys)
Journal of Algebra, 360:71–86, 2012
12. *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
13. *Generalised Hasse-Schmidt varieties and their jet spaces* (with T. Scanlon)
Proceedings of the London Math. Society, 103(2):197–234, 2011
14. *Model theory and complex geometry* (Feature article, invited submission)
Notices of the American Mathematical Society, 57(2):230–235, 2010
15. *Jet and prolongation spaces* (with T. Scanlon)
Journal de l’Institut de Mathématiques de Jussieu, 9(2):391–431, 2010
16. *On canonical bases and internality criteria* (with A. Pillay)
Illinois Journal of Mathematics, 52(3):901–917, 2008
17. *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
18. *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
19. *K-analytic vs CCM-analytic sets in nonstandard compact complex manifolds*
(with S. Starchenko), *Fundamenta Mathematicae*, 198(2):139–148, 2008
20. *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
21. *Stable definability and generic relations* (with B. Kim)
Journal of Symbolic Logic, 72(4):1163–1176, 2007
22. *Division points on subvarieties of isotrivial semiabelian varieties* (with D. Ghioca)
International Mathematics Research Notices, Article ID 65437, 23 pages, 2006

23. *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
24. *On saturation and the model theory of compact Kähler manifolds*
Journal für die reine und angewandte Mathematik, 586:1–20, 2005
25. *The model theory of compact complex spaces.* Logic Colloquium '01
(Eds. M. Baaz et al), Association for Symbolic Logic, 317–349, 2005
26. *A nonstandard Riemann existence theorem*
Transactions of the American Mathematical Society, 356(5):1781–1797, 2004
27. *F-structures and integral points on semi-abelian varieties over finite fields*
(with T. Scanlon)
American Journal of Mathematics, 126(3):473–522, 2004
28. *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
29. *On difference fields with quantifier elimination*
Bulletin of the London Mathematical Society, 33(6):641–646, 2001
30. *A note on uniform definability and minimal fields of definition*
Journal of Symbolic Logic, 65(2):817–821, 2000

Invited Participation at **Institute Workshops**

CIRM Luminy, France

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 *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

Stability Theoretic Methods in Unstable Theories *February 8–13, 2009*

Interactions between Model Theory and Geometry *March 13–18, 2004*

Invited **Colloquia**

Math Departmental Colloquium University of Notre Dame

“An application of model theory to Poisson algebras” *March 2015*

Logic Colloquium UCLA

“The canonical base property and the Zilber dichotomy revisited” *May 2014*

Logic Colloquium Harvard

“The canonical base property and the Zilber dichotomy revisited” *October 2013*

Géométrie et Théorie des Modèles Institut Henri Poincaré, Paris

“Model theory and bimeromorphic geometry” *March 2013*

Math and Stats Departmental Colloquia McMaster University

“Model theory and differential-algebraic geometry” *January 2012*

“Model theory and complex analytic geometry” *February 2006*

Math Departmental Colloquia University of Western Ontario

“A Hasse-Schmidt approach to expansions of algebraic geometry” *March 2011*

“Model theory and Kähler geometry” *November 2006*

Invited Talks at Conferences

- Bridges between Automatic Sequences and Algebra and Number Theory**
CRM, Montreal *Scheduled for May 2017*
- Joint Math. Meetings** Atlanta, GA *Scheduled for January 2017*
ASL Invited Address
“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”
- 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”
- Annual Conference of the Ramanujan Math Society** Pune, India
“The canonical base property and the Zilber dichotomy revisited” *June 2014*
- Model Theory in Geometry and Arithmetic** MSRI, Berkeley *May 2014*
“An application of the model theory of differential fields to Poisson algebras”
- Differential and difference equations, integrable systems, model theory**
University of Leeds, United Kingdom *September 2012*
“Model theory of fields with (noncommuting) operators”

- Model Theory and Applications** MPIM, Bonn, Germany *June 2012*
 “Algebraicity theorems in differential-algebraic geometry”
- Joint Math. Meetings** Boston, Massachusetts *January 2012*
 Special Session on Differential Algebraic Geometry and Galois Theory
 “Some new techniques in differential algebraic geometry from model theory”
- Model Theory Conference** Yonsei University, South Korea *May 2010*
 “ \aleph_0 -categorical strongly minimal Kähler manifolds”
- New Directions in the Model Theory of Fields** *July 2009*
 Durham, United Kingdom
 “Generalised Hasse varieties”
- Urbana in Lyon** France *July 2009*
 “A strengthening of internality”
- Joint Math. Meetings** (ASL Invited Address) Washington, DC *January 2009*
 “Jet spaces and the Zilber dichotomy”
- Second Canada-France Congress** (Model Theory Session) Montreal *June 2008*
 “An essentially saturated space not of Kähler-type”
- Antalya Algebra Days** Antalya, Turkey *May 2008*
 “Generalised Hasse varieties and jets”
- Model Theory of Fields** Luminy, France *November 2007*
 “A consequence of the canonical base property”
- MODNET Training Workshop** Humboldt-Universität, Berlin *September 2007*
 “Applications of model theory of fields: Zilber dichotomy and Mordell-Lang”
- CMS-MITACS Joint Conference** (Model Theory Session) Winnipeg *June 2007*
 “A consequence of the canonical base property”
- Differential Fields Workshop** University of Leeds, United Kingdom *June 2007*
 “Hasse schemes and jets”
- Model Theory and Groups** Oberwolfach, Germany *January 2007*
 “Division points on isotrivial semiabelian varieties”
- Greater Boston Logic Conference** MIT *May 2006*
 “Strongly minimal groups in the theory of compact complex spaces”
- Around o-minimality** University of Leeds, United Kingdom *March 2006*
 “Complex manifolds in CCM versus \mathbb{R}_{an} ”

- Model Theory, Algebraic and Analytic Geometry** *July 2005*
 Isaac Newton Institute, Cambridge, United Kingdom
 “Strongly minimal groups in the theory of compact complex spaces”
- Model Theory and Complex Analytic Geometry** *July 2004*
 Oberwolfach, Germany
 “Model-theoretic analysis in compact Kähler manifolds”
- Model Theory Workshop** BIRS, Alberta *March 2004*
 “Jet spaces in complex analytic geometry”
- Midwest Model Theory Meeting** Toronto *November 2003*
 “Differential Jet Spaces”
- Joint Math. Meetings** Baltimore, Maryland *January 2003*
 “ F -structures and semi-abelian varieties over finite fields”
- Model Theory and Applications** Ravello, Italy *May 2002*
 “ F -structures and semi-abelian varieties over finite fields”
- ASL European Summer Meeting – Logic Coll. ’01** Vienna *August 2001*
 “Some model theory of compact complex spaces”
- Joint Math. Meetings** (ASL Invited Address) New Orleans, LA *January 2001*
 “Saturated compact complex spaces”
- Midwest Model Theory Meeting** Madison, Wisconsin *November 2000*
 “Saturated compact complex spaces”
- ASL Annual Meeting** (Model Theory Session) Urbana, Illinois *June 2000*
 “Difference fields with quantifier elimination”

Invited Seminar Talks

- Kolchin Seminar in Differential Algebra** CUNY, New York
 “Differential varieties with only algebraic images” *November 2014*
 “Differential Arcs and the infinite-dimensional Zilber dichotomy” *October 2009*
- MSRI Seminar** Special day in differential and difference algebra
 “Differential-algebraic tangent spaces and internality to the constants” *April 2014*
- UCLA Logic Seminar**
 “The model theory of fields with free operators” *April 2014*

- Séminaire Général de Logique** Paris 7
 “The canonical base property” *May 2013*
- Geometry and Model Theory Seminar** Fields Institute
 “Algebraic reductions of hyperkaehler manifolds; model theory” *March 2013*
 “Nonstandard meromorphic groups” *October 2004*
- UC Berkeley Model Theory Seminar** California
 “Blow-ups of essentially saturated spaces” *April 2011*
 “Internality criteria” *April 2007*
 “Complex manifolds in CCM versus \mathbb{R}_{an} ” *May 2006*
- University of Western Ontario Analysis Seminar**
 “ \mathbb{R} -analytic versus \mathbb{C} -analytic families of complex-analytic sets” *January 2011*
- McMaster Model Theory Seminar**
 “On countably categorical compact complex manifolds” *November 2010*
 “Model-theoretic analysability in compact complex manifolds” *November 2003*
- University of Notre Dame Logic Seminar** Indiana
 “A model-theoretic counterpart to Moishezon morphisms” *April 2010*
 “The model theory of compact complex manifolds” *April 2008*
- CUNY Logic Workshop** New York
 “Canonical bases, jets, and the Zilber dichotomy” *October 2009*
 “Saturated compact complex manifolds” *November 2002*
- University of Leeds Logic Seminar** Leeds, UK
 “An essentially saturated surface not of Kähler-type” *July 2009*
- University of Illinois Logic Seminar** Chicago
 “An essentially saturated surface not of Kähler-type” *September 2008*
- UW Madison Logic Seminar** Wisconsin
 “Complex manifolds in CCM versus \mathbb{R}_{an} ” *April 2006*
- Cornell Logic Seminar** Ithaca
 “Absolute Mordell-Lang in positive characteristic” *January 2004*
- Connecticut Logic Seminar**, Middletown
 “Saturation in compact complex manifolds” *March 2003*
- Mid-Atlantic Mathematical Logic Seminar** New Jersey
 “Fields interpretable in compact complex manifolds” *September 2002*

Supervisory Experience

Post-doctoral

Levon Haykazyan	2016–
Yi Zhu (co-supervisor)	2015–
Jonathon Stephenson (co-supervisor)	2015–
Alex Wires (co-supervisor)	2013–2015
Pantelis Eleftheriou	2011–2013
Javier Moreno	2011
Bernie Anderson (co-supervisor)	2009–2011
Moshe Kamensky	2007–2009

Doctoral

Ruizhang Jin	2013–
Omar León Sánchez ¹	2008–2013
Thesis: <i>Contributions to the model theory of partial differential fields</i>	

Masters

Christopher Hawthorne	2015–2016
Essay: <i>Formal languages and the model theory of finitely generated free monoids</i>	
Ruizhang Jin	2012–2013
Essay: <i>Canonical bases in stable theories</i>	
Daniel Ivan	2011–2012
Essay: <i>Existentially closed Hasse fields</i>	
Allen O'Hara	2010–2011
Essay: <i>An introduction to equations and equational theories</i>	
Chris Eagle	2008–2010
Thesis: <i>The Mordell-Lang theorem from the Zilber dichotomy</i>	

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-Trainor² (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, Other

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

¹Winner of the faculty-wide 2013 Murray Martin Prize for graduate research

²Winner of the faculty-wide 2012 Jesse W.H. Zou Memorial Award for undergraduate research

Doctoral Thesis Committees

Matthew Luther, McMaster University, Math & Statistics	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 Freitag, 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

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

Set Theory and Model Theory PMath 733 (formerly 433/633)

Fall 2016 (24 Students), Winter 2015 (21 students), Fall 2012 (22 students)

Algebra for Honours Mathematics Math 135

Winter 2016 (51 students), Fall 2013 (175 students), Fall 2012 (162 students)

Fall 2011 (172 students)

Introduction to Commutative Algebra PMath 446/646

Winter 2016 (18 students)

Topics in Logic: **Stability Theory** PMath 930 (formerly 911,711)

Fall 2015 (9 students), Winter 2013 (9 students)

Groups and Rings PMath 347

Fall 2015 (36 students)

Topics in Algebra: **Valued Fields** PMath 900

Fall 2013 (16 students), Fall 2011 (18 students)

Readings in Pure Mathematics PMath 499

Spring 2012 (2 students)

Algebraic Curves PMath 764

Winter 2012 (22 students)

Service

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

Waterloo Committees

Faculty Association Departmental Representative,
 Department Advisory Committee on Appointments, Graduate Studies,
 Nominating Committee for Chair, Undergraduate Curriculum, Scholarships
 Colloquium Chair, Library Representative

Conference Organising Committees

CMS Winter Meeting Special Session on Model Theory
 Waterloo *Scheduled for December 2017*
 Workshop on Differential Galois Theory and Differential Algebraic Groups
 Fields Institute *Scheduled for 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 (Chair), 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 –*