

Nick Bezhanishvili

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Research interests

Logic in computer science, modal logic, intuitionistic logic, non-classical logics, lattices with operators, Heyting algebras, duality, order-topological structures, coalgebra, graph theory, domain theory, finite model theory.

Education

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| March 2006 | PhD in logic from ILLC, University of Amsterdam. Thesis: <i>Lattices of intermediate and cylindric modal logics</i> . Advisor: Professor Dick de Jongh, co-advisor: Dr. Yde Venema. |
| 2002–2006 | PhD student, Institute for Logic, Language and Computation, University of Amsterdam. Advisor: Professor Dick de Jongh. |
| June 2000 | Awarded MSc in Mathematics with honours from Tbilisi State University. Thesis: \mathbf{Df}_2 and its subvarieties. Advisor: Professor Leo Esakia. |
| 1998–2000 | MSc student, Tbilisi State University. |
| June 1998 | Awarded BSc in Mathematics with honours from Tbilisi State University. |
| 1994–1998 | BSc student, Tbilisi State University, |

Employment history

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| 09/2008-date | Research Associate in the project “Order-topological and model-theoretic methods in modal logic”, (EPSRC grant EP/F032102/1) Department of Computing, Imperial College London. |
| 10/2007-08/2008 | Fixed term lecturer in computer science, Department of Computer Science, University of Leicester. |
| 04/2006–09/2007 | Research Associate in the project “Coalgebras, Modal Logic, Stone Duality” (EPSRC grant EP/C0140414/1), Department of Computer Science, University of Leicester. |
| 01/2006-03/2006 | Fixed term lecturer in logic, University of Amsterdam. |

2000–2001 Research Associate in Mathematical Logic, Institute of Cybernetics, Georgian Academy of Sciences, Tbilisi, Georgia.

Grants/Awards Received

2010 Awarded £500 departmental bonus (Imperial College London) in recognition of high level of research activity over the year.

2010 Awarded £3000 British Council grant to co-organize a workshop “Algebra and Coalgebra meet Proof Theory” at Imperial College London.

2009 Co-author of (converted to GBP) £54,000 Georgian National Science Foundation grant “Duality theory and its applications to the semantics of non-classical logics”.

2008 Co-author of £287,208 EPSRC grant “Order-topological and model theoretic methods in modal logic”.

2006 Co-author of (converted to GBP) £24,000 Georgian National Science Foundation grant “Semantics of intuitionistic modal logic: algebraic and topological models”.

2006 Awarded €1500 NWO grant to organize “Amsterdam-London Workshop on Modal Logic” at University of Amsterdam.

Fall 2001 Winner of the 7th Soros Conference for Students and Postgraduate Students (I Prize), Tbilisi, Georgia.

Fall 1995 Winner of the First Soros Conference for Students and Postgraduate Students (III Prize), Tbilisi, Georgia.

Teaching experience

Fall 2009, 2010 *Modal and temporal logic*, a course for 4th-year undergraduate and MSc students taught with Ian Hodkinson and Clemens Kupke, 18 lectures (personally taught 5 lectures). Includes designing the course, preparing the lecture notes, coursework and exam papers.

Spring 2008 *Logic Programming*, a 2nd-year undergraduate course, University of Leicester, 16 lectures. Includes preparing coursework and exam papers.

Winter 2006 *Introduction to Category Theory and Categorical Logic*, an MSc course, University of Amsterdam, 14 lectures. Includes designing the course, preparing coursework and exam papers.

Fall 2006 Supervision (with Yde Venema) of Gaelle Fontaine for master’s thesis “Axiomatization of **ML** and **Cheq**”, University of Amsterdam, November 2006.

August 2005 *Intuitionistic logic*, a course taught with Dick de Jongh at ESSLLI’05, Edinburgh, UK. Includes designing the course and preparing the lecture notes.

- January 2006 Supervision of MSc students at the ILLC for the project “Intuitionistic Logic” (some of these papers were published as a technical report of the ILLC).
- January 2005 Supervision of MSc students at the ILLC for the project “Algebraic Logic”.

Other Teaching activity

- Winter 2009-date I have been giving popular lectures to school pupils (in the school ‘XXI century’, Tbilisi, Georgia) on history of logic and computer science (5 lectures up to now).

Professional activities

- Referee for *Theoretical Computer Science*.
- Referee for *Algebra Universalis*.
- Referee for *Journal of Philosophical logic*.
- Referee for *Studia Logica*.
- Referee for *Journal of Logic and Computation*.
- Referee for *Order*.
- Referee for *Fundamenta Informaticae*.
- Referee for *Mathematical Logic Quarterly*.
- Referee for *Central European Mathematical Journal*.
- Referee for *Journal of Applied Non-Classical Logics*.
- Referee for *Notre Dame Journal of Formal Logic*.
- Referee for *Advances in Modal Logic 2006, 2008, 2010*.
- Referee for the *ESSLLI Student Session, 2003, 2004*.
- Reviewer for *Mathematical Reviews*.
- Reviewer for *Zentralblatt Math*.
- July 2011 - date Area editor (Tbilisi LLC Symposium) of FoLLI-LNCS.
- Fall 2008 - date Co-organizer of the weekly “LogIC Seminar”, Department of Computing, Imperial College London.
- August 2012 Programme Committee member of “Advances in Modal Logic 2012” (AiML’12), Copenhagen, Denmark.
- April 2011 Programme Committee member of “The Swiss Workshop on Algebra and Coalgebra meet Proof Theory” (ALCOP’11), University of Bern.
- June 2010 Co-organizer of “The Second International Workshop on Topological Methods in Logic”, Tbilisi, Georgia.
- January 2010 Co-organizer of the Dutch-British workshop “Algebra and Coalgebra meet Proof Theory” (ALCOP’10), Imperial College London.

- September 2009 Organizer of the workshop dedicated to the birthdays of Leo Esakia and Dick de Jongh, satellite event of “The Eighth Tbilisi Symposium on Language, Logic and Computation”, Bakuriani, Georgia.
- Fall 2009, 2005 Program Committee member of “The Eighth and Sixth Tbilisi Symposiums on Language, Logic, and Computation”, Georgia.
- July 2009 Program committee member of “International Conference on Topology, Algebra and Categories in Logic” (TACL’09), Amsterdam, The Netherlands.
- June 2006 Co-organizer of the workshop “Modal Logic, Stone Duality, and Coalgebras”, Leicester, UK.
- March 2006 Organizer of “Amsterdam-London Workshop on Modal Logic”, Amsterdam, The Netherlands.
- Fall 2001, 2003, 2007 Organizing committee member of *The Fourth, Fifth and Seventh International Tbilisi Symposiums on Language, Logic, and Computation*, Georgia.
- June 2003 Organizing committee member of *An International Conference on Algebraic and Topological methods in Non-Classical Logics I* (TANCL’03), Tbilisi, Georgia.
- November 2006 Member of Master’s Defense Committee for Jacob Vossmaer, University of Amsterdam.
- September 2004 Member of Master’s Defense Committee for Spencer Gerhard, University of Amsterdam.
- June 2004 Member of Master’s Defense Committee for Mark Theunissen, University of Amsterdam.
- March 2004 Member of Master’s Defense Committee for Be Birchail, University of Amsterdam.

Invited Talks

- April 2011 *Sahlqvist theorem for admissible fixed point logic*, a series of talks given at logic seminars of City University New York (CUNY), Cornell University, University of Denver, Indiana University, Chapman University, New Mexico State University.
- May 2010 *Coalgebraic semantics of modal logic*. Logic Seminar, University of Bern.
- September 2009 *Generalized Jankov-de Jongh formulas and generalized Esakia duality*. Workshop dedicated to the birthdays of Leo Esakia and Dick de Jongh, Bakuriani, Georgia.
- May 2009 *Generalized Esakia duality*, Theory Seminar, University of Oxford.

- March 2009 *Free Heyting algebras: coalgebraic approach*, Coalgebra Day, CWI, Amsterdam.
- June 2008 *Bitopological Duality for Distributive Lattices and Heyting Algebras*, International Workshop on Topological Methods in Logic, Tbilisi, June 3-5, 2008.
- January 2008 *Extensions of $\mathbf{S5}$ -squared: decidability and complexity*, Algorithms and Complexity Group Seminar, University of Leicester.
- January 2008 *Vietoris bisimulations of descriptive models*, Istanbul Kultur University, Turkey.
- May 2007 *Frame-based formulas for modal logics*, Verification and Testing Group Seminar, University of Sheffield.
- May 2007 *A coalgebraic view on canonical models of modal logic*, Workshop “Logics for Coalgebras”, University of Amsterdam.
- March 2007 *Profinite Heyting algebras*, Theory Seminar, Department of Computer Science, University of Birmingham.
- October 2006 *Free modal algebras*, Algebra and Topology Seminar, Mathematics Institute, University of Oxford.
- October 2006 *Free modal algebras: an overview*, Logic and Computation Seminar, Department of Computer Science, University of Liverpool.
- February 2006 *Axiomatizations of modal logics using frame-based formulas*, Mathematical Logic Seminar, ULB, Brussels.
- June 2004 *Introduction to intuitionistic propositional logic*, (with Dick de Jongh), OZSL schoolweek, Utrecht University.
- April 2004 *The logic of the Rieger-Nishimura ladder*, Math. Logic Colloquium, University of Amsterdam.
- November 2003 *Extensions of $\mathbf{S5}^2$ and better-quasi-orderings*, ILLC-Day in Bonn, University of Bonn.
- March 2003 *n-universal models and extendible sets*, Logic Tea, University of Amsterdam.
- November 2002 *Two-dimensional cylindric algebras*, GLCC Seminar, King’s College London.
- May 2002 *Normal extensions of $S5$ -square*, Mathematical Logic Seminar, ULB, Brussels.

Conference Talks

- July 2011 *Sahlqvist preservation for modal μ -algebras*, Topology, Algebra and Categories in Logic (TACL’11), Marseille, France.
- May 2011 *An algebraic approach to canonical formulas*, International workshop on unification and admissible rules, Utrecht University, The Netherlands.

- June 2010 *Sahlqvist theorem for modal fixed point logic*, International workshop on topological methods in logic, Tbilisi, Georgia.
- December 2009 *Model theory of descriptive frames*, International workshop on coalgebraic logics, Schloss Dagstuhl, Germany.
- September 2009 *Free Heyting algebras*, 3rd International Conference on Algebra and Coalgebra in Computer Science, CALCO'09, Udine.
- July 2009 *An algebraic approach to canonical formulas: Intuitionistic case*, TACL'09, Amsterdam.
- September 2008 *Bitopological Duality for Distributive Lattices and Heyting Algebras*, Domains IX, Brighton, UK.
- May 2008 *Free Heyting algebras: revisited*, ManyVal'08, University of Milan, Italy.
- October 2007 *Extendable formulas in two variables in intuitionistic logic*, 7th International Tbilisi Symposium on Language, Logic and Computation, Tbilisi, Georgia.
- August 2007 *Free modal algebras: a coalgebraic perspective*, 2nd Conference on Algebra and Coalgebra in Computer Science, Bergen, Norway.
- August 2007 *Profinite Heyting algebras*, Algebraic and Topological Methods in Non-Classical Logics III, University of Oxford, Oxford.
- November 2006 *Free modal algebras: a coalgebraic perspective*, Coalgebra Day, University of Nijmegen.
- June 2006 *The final coalgebra for the Vietoris functor*, Modal logic, Stone duality, and Coalgebras, University of Leicester.
- June 2005 *The variety generated by the Rieger-Nishimura lattice*, Algebraic and Topological Methods in Non-Classical Logics II, Barcelona.
- December 2004 *A spatio-temporal logic of \mathbb{R}* , OZSL Accolade, Nunspeet.
- September 2004 *Sahlqvist theory and transfer results for hybrid logic*, Advances in Modal Logic 2004, Manchester.
- December 2003 *Transfer results for hybrid logic*, HyLo'5, University of Amsterdam.
- June 2003 *Exact and extendible formulas in intuitionistic propositional calculus*, Algebraic and Topological Methods in Non-Classical Logics I, Tbilisi State University.
- October 2002 *Automorphisms of the Lindenbaum-Tarski algebra of intuitionistic logic*, OZSL Accolade, University of Amsterdam.
- August 2002 *Projective formulas in two variables in intuitionistic propositional logic*, Logic Colloquium 2002, Muenster.

- November 2001 *Lattices of varieties of two-dimensional cylindric algebras*, Soros Conference for Graduate and Post Graduate Students, Georgian Academy of Sciences, Tbilisi.
- September 2001 *Subvarieties of \mathbf{CA}_2* , The Fourth Tbilisi International Symposium on Language, Logic and Computation, Borjomi.
- September 1999 *\mathbf{Df}_2 and its subvarieties*, The Third Tbilisi International Symposium on Language, Logic and Computation, Chakvi.
- September 1997 *Monadic and pseudomonadic algebras*, The Second Congress of Georgian Mathematicians, Technical University of Tbilisi.
- November 1995 *The variety of pseudomonadic algebras*, Soros Conference for Graduate and Post Graduate Students, Georgian Academy of Sciences, Tbilisi.

PhD Thesis

- 2006 N. Bezhanishvili, *Lattices of Intermediate and Cylindric Modal Logics*, University of Amsterdam, 224 pages.

Journal Articles

- 2011 N. Bezhanishvili and D. de Jongh, *Extendable formulas in two variables in intuitionistic logic*. *Studia Logica*, to appear. Available at <http://www.doc.ic.ac.uk/~nbezhani/Papers>.
- 2011 J. van Benthem, N. Bezhanishvili, I. Hodkinson, *Sahlqvist correspondence for modal mu-calculus*. *Studia Logica*, to appear. Available at <http://www.doc.ic.ac.uk/~nbezhani/Papers>.
- 2011 N. Bezhanishvili and M. Gehrke, *Finitely generated free Heyting algebras via Birkhoff duality and coalgebra*, *Logical Methods in Computer Science*, to appear.
- 2011 G. Bezhanishvili and N. Bezhanishvili, *An algebraic approach to canonical formulas: Modal case*. *Studia Logica*, 99 pp. 337–369.
- 2010 N. Bezhanishvili, G. Fontaine, Y. Venema *Victoris bisimulations*, *Journal of Logic and Computation*, vol 20, (5), pp. 1017–1040.
- 2010 G. Bezhanishvili, N. Bezhanishvili, D. Gabelaia, A. Kurz, *Bitopological duality for distributive lattices and Heyting algebras*, *Mathematical Structures in Computer Science*, vol 20, (3), pp. 359–393.
- 2009 G. Bezhanishvili and N. Bezhanishvili, *An algebraic approach to canonical formulas: Intuitionistic case*, *Review of Symbolic Logic*, vol 2, (3), pp. 517–549.
- 2008 G. Bezhanishvili and N. Bezhanishvili, *Profinite Heyting algebras*, *Order*, vol. 25 (3), pp. 211–223.

- 2008 N. Bezhanishvili, *Frame based formulas for intermediate logics*, *Studia Logica*, vol. 90, pp. 139-159.
- 2008 G. Bezhanishvili, N. Bezhanishvili, D. de Jongh, *The Kuznetsov-Gerciu and Rieger-Nishimura Logics: The Boundaries of the Finite Model Property*, Special Issue of Logic and Logical Philosophy Dedicated to A.V. Kuznetsov, vol. 17, pp. 73-110.
- 2006 N. Bezhanishvili and B. ten Cate, *Transfer results for hybrid logic Part I: the case without satisfaction operators*, *Journal of Logic and Computation*, 16, pp. 177-197.
- 2004 N. Bezhanishvili and I. Hodkinson, *All normal extensions of S5-squared are finitely axiomatizable*, *Studia Logica*, 78, pp. 443-457.
- 2004 N. Bezhanishvili, *Varieties of two-dimensional cylindric algebras. Part II*, *Algebra Universalis*, 51, pp. 177-206.
- 2003 N. Bezhanishvili and M. Marx, *All proper normal extensions of S5-square have the polynomial size model property*, *Studia Logica*, 73, pp. 367-382.
- 2002 N. Bezhanishvili, *Varieties of two-dimensional cylindric algebras. Part I: Diagonal-free case*, *Algebra Universalis*, 48, pp. 11-42.
- 2002 N. Bezhanishvili, *Pseudomonadic algebras as algebraic models of doxastic modal logic*, *Mathematical Logic Quarterly*, 48, pp. 624-636.

Refereed Conference Proceedings

- 2009 N. Bezhanishvili and M. Gehrke, *Free Heyting algebras: Revisited*, *Proceedings of International Conference on Algebra and Coalgebra in Computer Science, CALCO'09, LNCS 5728*, pp. 251-266.
- 2007 N. Bezhanishvili and A. Kurz, *Free modal algebras: a coalgebraic perspective*, *CALCO 2007, LNCS 4624*, pp. 143-157.
- 1999 N. Bezhanishvili, *Distributive lattices with quantifier: Topological representation*, *Proceedings of the ESSLLI Student Session, Utrecht 1999*, pp. 91-101.
- 1996 N. Bezhanishvili, *Pseudomonadic algebras*, *Proceedings of the ESSLLI Student Session, Prague 1996*, pp. 1-5.

Books and Book Chapters

- 2011 N. Bezhanishvili, *Varieties of two-dimensional cylindric algebras*, *Handbook of Cylindric Algebras*, H. Andréka, M. Ferenczi, I. Németi editors, Springer, to appear.
- 2011 N. Bezhanishvili, S. Löbner, K. Schwabe, L. Spada, (eds) *8th Tbilisi Symposium on Logic, Language and Computa-*

tion, TbiLLC'09, Revised Selected Papers, Lecture Notes in Artificial Intelligence, LNAI 6618, Springer, 2011.

Submitted Papers

- 2011 N. Bezhanishvili and I. Hodkinson, *Preservation of Sahlqvist fixed point equations in completions of relativized fixed point BAOs*. Submitted. Available at <http://www.doc.ic.ac.uk/~nbezhan/Papers>.
- 2010 N. Bezhanishvili and I. Hodkinson, *Sahlqvist theorem for modal fixed point logic*. Submitted. Available at <http://www.doc.ic.ac.uk/~nbezhan/Papers>.

Other Publications

- 2006 N. Bezhanishvili and D. de Jongh, *Intuitionistic Logic*, ILLC, University of Amsterdam, PP-2006-2, 57 pages.
- 2004 N. Bezhanishvili, *De Jongh's characterization of intuitionistic propositional calculus*, Liber Amicorum Dick de Jongh, Amsterdam.

In Preparation

- 2011 N. Bezhanishvili, C. Kupke, P. Panangaden, *A duality theory for automata*.
- 2011 G. Bezhanishvili, N. Bezhanishvili, J. Harding, *Modal de Vries algebras*.

August 25, 2011