# Antonina Kolokolova


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## Research Interests

Complexity theory and logic in computer science, in particular bounded arithmetic, finite model theory, descriptive complexity, computational logic.

## Education

Ph.D. Computer Science: University of Toronto, 2005
Supervisor: Stephen A. Cook
Thesis: *Theories of arithmetic from descriptive complexity*

M.Sc. Computer Science: University of Toronto, 2000
Supervisor: Stephen A. Cook
Thesis: *V-Horn: a Horn-based second-order theory of arithmetic*

B. Sc. Computer Science and Mathematics: University of Arizona, 1998.
Honours thesis in Computer Science on proof complexity, supervised by Toniann Pitassi.
Honours thesis in Mathematics on dynamical systems, supervised by William Schaffer.

## Publications

*In refereed journals:*

- Antonina Kolokolova, " Expressing vs. proving: relating forms of complexity in logic" , Journal of Logic and Computation (electronic version available on journal webpage Feb 2010, printed volume to appear).
- Stephen Cook and Antonina Kolokolova, "A second-order system for polytime reasoning based on Grädel's theorem", Annals of Pure and Applied logic 124 (2003), 193-231.

*In refereed conferences:*

- Antonina Kolokolova, Yongmei Liu, David G. Mitchell and Eugenia Ternovska, "On complexity of Model expansion.", at LPAR-17, LNCS 6397, pages 447-458.
- Russell Impagliazzo, Valentine Kabanets, Antonina Kolokolova, "An axiomatic approach to algebrization", in proceedings of 41st ACM Symposium on Theory of Computing (STOC 2009), pages 695-704.
- Antonina Kolokolova, "Many facets of complexity in logic", **invited paper** at Computability in Europe (CiE 2008), LNCS 5028, pages 316-325.
- Antonina Kolokolova, "Closure properties of weak systems of bounded arithmetic", in proceedings of the 14th Conference on Computer Science Logic (CSL 2005), pages 369-383.

- Stephen Cook and Antonina Kolokolova, "Bounded arithmetic of NL", in Proceedings of the 19th annual IEEE symposium on Logic in Computer Science (LICS 2004), pages 398-407.
- Stephen Cook and Antonina Kolokolova, "A second-order system for polynomial-time reasoning based on Grädel's theorem", in proceedings of the 16th annual IEEE symposium on Logic in Computer Science (LICS 2001), pages 177-186.

*Tech. reports, workshops and other:*

- Antonina Kolokolova, Yongmei Liu, David G. Mitchell and Eugenia Ternovska, "On complexity of Model expansion.", short paper at LPAR-16.
- Michal Koucky, Valentine Kabanets, Antonina Kolokolova, "Expanders made elementary", in preparation.
- Antonina Kolokolova, Yongmei Liu, David G. Mitchell and Eugenia Ternovska, "Model expansion and the expressiveness of FO(ID) and other logics". Simon Fraser University technical report TR2007-29, 2007
- Antonina Kolokolova, Yongmei Liu, Eugenia Ternovska and David Mitchell, " Complexity of Expanding a Finite Structure and Related Tasks". workshop on Logic and Computational Complexity (LCC 2006).
- Stephen Cook and Antonina Kolokolova, "A second-order system for polynomial-time reasoning based on Grädel's theorem", Electronic Colloquium on Computational Complexity technical report TR01-024, 2001.

**Invited talks**

- Invited speaker at the International Workshop *Logical approaches to Barriers in Computing and Complexity*, Greifswald, 2010.
- A plenary speaker at the *Computability in Europe: Logic and Theory of Algorithms (CiE 2008)* conference.

**Invited workshops**

- Newton institute in Cambridge *On aspects of Turing's work*, 2012
- BIRS workshop on *Proof complexity*, 2011 (organizer).
- Bellairs *Workshop on Computational Complexity*, 2007, 2008, 2009,2010.
- Oberwolfach *Meeting on Proof Complexity*, 2008
- Newton's Institute in Cambridge *New Directions in Proof Complexity*, 2006
- BIRS workshops on *Advances in Computational Complexity*, 2004, 2006, 2008,2010
- Institute for Advanced Study workshop on *Complexity of Proofs and Computations* in Princeton, 2001.

**Research funding**

- **2008-now** NSERC discovery grant, $16,000/year for 5 years.
- **2007-2008** Start-up grant, MUN Computer Science, $20,000.

**Awards and scholarships**

- **2005,2006**: PIMS postdoctoral fellowship
- **2002-2003**: Ontario graduate scholarship
- **1998-1999,2000-2001**: University of Toronto fellowship

**Service**

- *Refereeing:* Annals of Pure and Applied Logic, Discrete Applied Math. Journal, Archive for Math. Logic, Journal of Logic and Computation, Math Reviews
- *Lecture notes:* Preparation of a manuscript for lectures by Steven Rudich and Avi Wigderson at the IAS/Park City Summer School 2000, published as IAS/Park City Mathematics Series volume 10 "Computational Complexity Theory", Steven Rudich and Avi Wigderson (editors).

**Academic employment**

- *Faculty position*
  - **July 2007 - now:** Assistant professor, Memorial University of Newfoundland
- *Visiting position*
  - **Sep 2009-May 2010** Visitor at the Institute for Advanced Study, Princeton, NJ
- *Postdoctoral employment*
  - **Jan 2005– May 2007:** Postdoctoral fellow, School of Computing Science, Simon Fraser University (supported in part by PIMS).
  - **Sep 2004–Dec 2004, May 2005–Aug 2005:** Visiting scientist, Mathematical Institute of Czech Academy of Sciences in Prague, Czech Republic.
- *Instructorships*
  - **Fall 2005, Spring 2007:** Simon Fraser University
  - **Winter 2004:** York University
  - **Summer, Fall 2003, Winter 2004:** University of Toronto.

**Non-academic work experience**

- **Jan 2000-Dec 2001:** System administrator, University of Toronto, Dept. of Computer Science (CSLab).
- **Oct 1996-May 1998:** System administrator, Planetary Science Institute, Arizona.
- **May 1995-Mar 1997:** System administrator assistant, University of Arizona, Chemistry department.