

## Henning Arnor Ulfarsson

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*Last updated:* October 1, 2014

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### PERSONAL

Born 11/21/1981 in Reykjavik, Iceland. Citizen of Iceland. Married with three daughters

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### ACADEMIC POSITIONS

- Assistant Professor, School of Computer Science,  
**Reykjavik University**, Reykjavik, Iceland, (Half-time: 12/2010-08/2013, Full-time: 08/2013-)
  - Postdoctoral Researcher, School of Computer Science,  
**Reykjavik University**, Reykjavik, Iceland, (9/2009-6/2013)
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### EDUCATION

- **Brown University**, Providence, Rhode Island, USA (2004-2009)
    - Ph.D. in Mathematics, June 2009  
Thesis: *Extending Grothendieck topologies to diagram categories and Serre functors on diagram schemes*
    - M.Sc. in Mathematics, May 2006
  - **University of Iceland**, Reykjavik, Iceland (2001-2004)
    - B.Sc. in Mathematics, June 2004
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### RESEARCH INTERESTS

My research interests are in the areas of algebraic geometry and algebraic combinatorics and their intersections, in particular Schubert calculus of Grassmannians and flag varieties, Young tableaux, patterns in permutations and equivalence relations on the symmetric group. Recently I have also become interested in the SINR-model in ad-hoc wireless networks, especially its mathematical properties.

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### PUBLICATIONS AND PREPRINTS

#### Publications in Journals.

- H. Ulfarsson and A. Woo. *Which Schubert varieties are local complete intersections?*  
The Proceedings of the London Mathematical Society, Volum 107 (2013) Issue No. 5, 1004–1052  
<http://arxiv.org/abs/1111.6146>
- S. Kitaev, P. Salimov, C. Severs and H. Ulfarsson. *Restricted non-separable planar maps and some pattern avoiding permutations*  
in Discrete Applied Mathematics 161 (2013), pp. 2514–2526  
<http://arxiv.org/abs/1202.1790>
- H. Ulfarsson. *Describing West-3-stack-sortable permutations with permutation patterns*  
Séminaire Lotharingien de Combinatoire, Volume 67 (2012), Article B67d  
<http://www.mat.univie.ac.at/~slc/wpapers/s67ulfarss.pdf>
- J. Sack and H. Ulfarsson. *Refined inversion statistics on permutations*  
Electronic Journal of Combinatorics, Volume 19 (2012)  
<http://arxiv.org/abs/1106.1995>

- H. Ulfarsson. *A unification of permutation patterns related to Schubert varieties*  
Pure Mathematics and Applications Volume 22 (2011) Issue No. 2, 273–296  
<http://arxiv.org/abs/1002.4361>
- S. Kitaev, P. Salimov, C. Severs and H. Ulfarsson. *Word-representability of line graphs*  
Open Journal of Discrete Mathematics, Volume 1, Number 2 (2011), 96–101  
<http://arxiv.org/abs/1102.3980>
- Q. Chen, S. Marcus and H. Ulfarsson. *Very twisted stable maps*  
Communications in Analysis and Geometry, Volume 18, Number 4. (2010), 831–855  
<http://arxiv.org/abs/0811.0035>

#### Publications in Conference Proceedings.

- A. Claesson and H. Ulfarsson. *Sorting and preimages of pattern classes*  
The 24th International Conference on Formal Power Series & Algebraic Combinatorics, Nagoya, Japan, 2012  
Discrete Math. Theor. Comput. Sci. Proc. AR (2012), 595–606  
<http://arxiv.org/abs/1203.2437>
- H. Ulfarsson and A. Woo. *Which Schubert varieties are local complete intersections? Extended abstract*  
The 24th International Conference on Formal Power Series & Algebraic Combinatorics, Nagoya, Japan, 2012.  
Discrete Math. Theor. Comput. Sci. Proc. AR (2012), 753–764
- S. Kitaev, P. Salimov, C. Severs and H. Ulfarsson. *On the representability of line graphs*  
The 15th Conference on Developments in Language Theory, Milan, Italy, 2011. G. Mauri and A. Leporati (Eds.): DLT 2011, LNCS 6795, pp. 478–479. Springer, Heidelberg (2011)  
<http://arxiv.org/abs/1102.3980>
- H. Ulfarsson. *A unification of permutation patterns related to Schubert varieties. Extended abstract*  
The 22nd International Conference on Formal Power Series & Algebraic Combinatorics, San Francisco, 2010.  
Discrete Math. Theor. Comput. Sci. Proc. AN (2010) 1057–1068  
<http://arxiv.org/abs/1002.4361v2>

#### Preprints.

- M. Albert, B. Gudmundsson and H. Ulfarsson. *Collatz permutations*  
Preprint 2014, <http://arxiv.org/abs/1404.3054>
- I. Hilmarsson, I. Jonsdottir, S. Sigurdardottir, L. Vidarsdottir and H. Ulfarsson. *Wilf-classification of mesh patterns of short length*  
Submitted 2014, <http://arxiv.org/abs/1409.3165>
- E. Asgeirsson, J. Foley, H. Gudmundsdottir, M. Halldorsson, G. Järvelä, H. Ulfarsson and Y. Vigfusson. *Measurement Based Interference Models for Wireless Scheduling Algorithms*  
Preprint 2014, <http://arxiv.org/abs/1401.1723v1>
- H. Magnusson and H. Ulfarsson. *Algorithms for discovering and proving theorems about permutation patterns*  
Preprint 2013, <http://arxiv.org/abs/1211.7110>
- H. Ulfarsson. *Pattern avoiding equivalence classes*  
Preprint 2010, <http://arxiv.org/abs/1005.5419>

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#### STUDENTS

##### Ph.D. students.

- Christian Bean, fall 2014 – .

##### M.Sc. students.

- Hjalti Magnússon, spring 2012 – spring 2013.
- Sigríður Viðarsdóttir, fall 2012 –

##### Final Projects of B.Sc. students.

- *A responsive web site for the smart market for study-room allocation at Reykjavik University* (fall 2012)  
Co-supervised two B.Sc. students at RU, Gudrun Sif Hilmarisdottir and Patrekur Patrekson, on a final project.
- *A smart market for study-room allocation at Reykjavik University* (fall 2011)  
Co-supervised two B.Sc. students at RU, Anna Sigga Lúðvíksdóttir and Sævar Jónasson, on a final project.
- *Wilf-classification of mesh patterns and marked mesh patterns* (spring 2011)  
Supervised four B.Sc. students at RU, Ingibjörg Jónsdóttir, Ísak Hilmarsson, Sigríður Viðarsdóttir and Steinunn

Sigurðardóttir, on a final project, which was accepted for a talk at the conference Permutation Patterns 2011.  
[http://web.mac.com/hemsa/Ulfarsson/Research\\_files/Allt.pdf](http://web.mac.com/hemsa/Ulfarsson/Research_files/Allt.pdf)

### Smaller projects.

- *UROP: A Haskell implementation of BiSC* (fall 2012)  
Supervised a B.Sc. student at RU, Helgi Kristvin Sigurbjarnarson, on the porting of the BiSC pattern mining algorithm to Haskell
- *Game theory and pattern avoidance* (fall 2010)  
Supervised an M.Sc. student at RU, Hjalti Magnússon, on a small project related to the course Game Theory, RU fall 2010. [http://web.mac.com/hemsa/Ulfarsson/Students\\_files/PatternGame.pdf](http://web.mac.com/hemsa/Ulfarsson/Students_files/PatternGame.pdf)

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### SELECTED TALKS, PRESENTATIONS AND POSTERS

- New York Combinatorics Seminar, City University New York, USA, June 2014  
*Guessing and proving theorems for permutation patterns.* Joint work with A. Claesson and H. Magnusson.
- Permutation Patterns, East Tennessee State University, USA, July 2014  
Poster: *Collatz meets Fibonacci.* Joint work with M. Albert, who presented, and B. Gudmundsson.
- The 26th International Conference on Formal Power Series & Algebraic Combinatorics, Chicago, USA July 2014  
Software demonstration: *Algorithms for discovering and proving theorems involving permutation patterns.*
- MIT Combinatorics Seminar, Boston, MA, October 2013.  
*Permutations, patterns and algorithms.*
- Permutation Patterns, University Paris Diderot, Paris, France, July 2013  
*The interaction between equivalence relations on the symmetric group and pattern avoidance.* Joint work with A. Claesson.
- Permutation Patterns, University Paris Diderot, Paris, France, July 2013  
*Bijjective maps based on mesh patterns.* Joint work with L. Vidarsdottir, who presented.
- Permutation Patterns, University Paris Diderot, Paris, France, July 2013  
*Preimages of single-pass sorting operators.* Joint work with H. Magnusson, who presented.
- The Pearls of Computer Science Colloquium, Reykjavik University, Iceland, May 2013  
*Donald Knuth: The great inventor*
- ICE-TCS Seminar, Reykjavik University, Iceland, March 2013  
*Crazy bijections between planar maps, beta-trees and permutations.* Joint work with S. Kitaev, P. Salimov and C. Severs
- 2013 Joint Mathematics Meetings, San Diego, CA, January 2013  
*GRIM: An algorithm for the discovery of generalized permutation patterns.*  
Joint work with A. Claesson
- The 24th International Conference on Formal Power Series & Algebraic Combinatorics, Nagoya, Japan, August 2012  
*Sorting and preimages of pattern classes.* Joint work with A. Claesson
- The 24th International Conference on Formal Power Series & Algebraic Combinatorics, Nagoya, Japan, August 2012  
Poster: *Which Schubert varieties are local complete intersections?.* Joint work with A. Woo
- Permutation Patterns, University of Strathclyde, Glasgow, UK, June 2012  
*Automated discovery of permutation patterns.* Joint work with A. Claesson.
- Reykjavik University Lecture Marathon, Iceland, March 2012  
*Proof by Computer*
- ICE-TCS Seminar, Reykjavik University, Iceland, February 2012  
*Automatic discovery of permutation patterns.* Joint work with A. Claesson
- 2012 Joint Mathematics Meetings, Boston, MA, January 2012  
*Restricted rooted non-separable planar maps. Preliminary Report.*  
Joint work with S. Kitaev, P. Salimov and C. Severs
- Mathematics in Iceland 2011, Conference of the Icelandic Mathematical Society, Reykholt, November 2011  
*Maps, trees and patterns.* Joint work with S. Kitaev, P. Salimov and C. Severs
- Computer and Information Sciences Seminar, University of Strathclyde, Glasgow, UK, October 2011  
*Sorting algorithms and permutation patterns.*
- ICE-TCS Seminar, Reykjavik University, Iceland, October 2011  
*Patterns prohibiting sorting.*

- University of Washington Combinatorics Seminar, WA, June 2011  
*Generalized permutation patterns and their applications.*
- Permutation Patterns, California Polytechnic State University, CA, June 2011  
*Marked mesh patterns and local complete intersection Schubert varieties.* Joint work with A. Woo.
- ICE-TCS Theory Day, Reykjavik University, Iceland, May 2011  
*Marked mesh patterns and connections with geometry.*
- Joint Mathematics Meetings, New Orleans, Louisiana, January 2011  
*Local complete intersection Schubert varieties. Preliminary Report.* Joint work with A. Woo who presented.
- Reykjavik University Lecture Marathon, Iceland, March 2010  
*The Icesave dispute from the viewpoint of game theory.* Joint work with Jón Thór Sturluson.
- Mathematics Colloquium, California State University, Long Beach, California, December 2010  
*Counting special inversions in permutations.* Joint work with Joshua Sack who presented.
- Permutation Patterns, Dartmouth College, NH, August 2010  
*Detecting singularities of Schubert varieties with permutation patterns.*
- Formal Power Series & Algebraic Combinatorics, San Francisco State University, CA, August 2010  
Poster: *A unification of permutation patterns related to Schubert varieties.*
- Summer Meeting of the Canadian Mathematical Society, University of New Brunswick, Fredericton, Canada, June 2010  
*Equivalence relations on permutations and pattern avoidance.*
- 10th Nordic Combinatorial Conference, Reykjavik University, Iceland, May 2010  
*Toric permutations and pattern avoidance.*
- Mathematics Colloquium, University of Iceland, Reykjavik, Iceland, March 2010  
*Patterns in algebraic geometry.*
- Conference of the Icelandic Mathematical Society, Leirubakki, September 2009  
*Young tableaux and patterns in permutations.*
- Mathematics Colloquium, University of Iceland, Reykjavik, Iceland, March 2009  
*Teaching mathematics with Sage.*
- Graduate Conference in Algebra and Topology, SUNY Binghamton University, Binghamton, NY, November 2008  
*Configuration schemes and their Serre functors.* A subset of this work is joint with J. Wise.
- Graduate Student Presentation, PCMI Graduate Summer School on Analytic and Algebraic Geometry: Common Problems—Different Methods, Park City Mathematics Institute, Park City, UT, July 2008  
*Configuration schemes and their Serre functors.* A subset of this work is joint with J. Wise.
- Graduate Student Seminar, Brown University, Providence, RI, November 2007  
*Sheaves on Configuration Schemes.*
- Lecture, Commercial College of Iceland, Reykjavik, Iceland, April 2003  
*Introduction to Metric Spaces.*

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## SELECTED TEACHING EXPERIENCE

### Reykjavik University, Iceland.

- Spring 2014: Organized a 12 week course, Game Theory (E-409-LEIK) for B.Sc. and M.Sc. students in computer science and mathematics
- Spring 2014: Organized a 12 week course, Topology (T-612-GRAND) for B.Sc. and M.Sc. for students in discrete mathematics and computer science
- Spring 2014: Organized a 12 week course, Algebra and Combinatorics (T-218-ALCO) for B.Sc. students in discrete mathematics and computer science
- Fall 2013: Organizing a 15 week course, Cryptography and Number Theory (T-513-CRNU) for B.Sc. students in discrete mathematics and computer science
- Spring 2013: Organized a 12 week course, Algebra and Combinatorics (T-218-ALCO) for B.Sc. students in discrete mathematics and computer science
- Fall 2012: Organized a 15 week course, Mathematical Programming (E-402-STFO) for B.Sc. students in computer science and mathematics
- Summer 2012: Organized a 6 week course, Functional Programming (T-209-FUPR) for B.Sc. students in computer science and mathematics
- Fall 2011: Organized a 15 week course, Topology with Application to Computer Science (T-635-TOAP) for B.Sc. students in computer science and mathematics

- Summer 2011: Organized two 4 week courses, Mathematics II (AT STÆ2003) for B.Sc. students in civil engineering and Calculus II (T-201-STA2) for B.Sc. students in engineering
- Spring 2011: Organized a 12 week course, Mathematical Programming (E-402-STFO) for B.Sc. students in computer science and mathematics
- Fall 2010: Organized a 13 week course, Game Theory (E-409-LEIK) for B.Sc. and M.Sc. students in computer science and mathematics
- Spring 2010: Organized a 13 week course, Statistics (T-217-STAT), for B.Sc. students in computer science
- Fall 2009: Organized a 12 week course, Complex Analysis (T-310-COAN), for B.Sc. students in mathematics
- Spring 2009: Organized a three week course, Introduction to Algebraic Geometry (E-312-IALR) for B.Sc. students in mathematics
- Fall 2008: Organized a 6 week reading course, Metric Spaces (E-514-FRID), for B.Sc. students in mathematics
- Fall 2008: Organized a 6 week reading course Topology (E-612-GRAN), for B.Sc. students in mathematics
- Fall 2008: Organized a 12 week course, Mathematical Analysis II (E-208-CALC), for B.Sc. students in mathematics

#### **Brown University, Providence, Rhode Island, USA.**

- Fall 2007 - Spring 2008: Obtained the Sheridan Center Teaching Certificate #1. This certificate is attained after participating in the Sheridan Center teaching seminar and having one's teaching observed and critiqued by teaching consultants from the center
- Fall 2007: As a Teaching Fellow I was responsible for lectures for Advanced Placement Calculus (Math 0190), grading of exams and holding office hours
- Summer 2007: As a Course Instructor at the Brown University Summer School I organized the summer version of Introductory Calculus II (Math 0100)

#### **University of Iceland.**

- Fall 2003: Responsible for problem sessions for Calculus IB, for B.Sc students in engineering

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#### PROFESSIONAL EXPERIENCE

- **Specialist**, Landsbanki Íslands (Bank in Iceland) 7/06-8/06  
Pricing of complex derivatives using, among other things, binomial trees. Involved considerable programming in MatLab
- Talnatök inc. (Educational company in Iceland) 6/05-8/05  
Preparation of course material for a preparatory course for students entering the Department of Engineering at the University of Iceland; served also as a substitute teacher
- **Research Assistant**, Dept. of Mathematics, University of Iceland 6/03-8/03, 6/04-8/04  
Assisted Dr. Reynir Axelsson in preparing textbooks for publication, mainly by drawing figures and proofreading
- **Research Assistant**, Dept. of Physics, University of Iceland, 6/02-8/02  
Assisted Dr. Ari Ólafsson on the construction of a 70 ft. Foucault pendulum and on a photoacoustic project
- **Programmer**, deCODE genetics, Reykjavik, Iceland, 6/01-8/01  
Debugging of software (Black-box debugging)

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#### COMPUTER SKILLS

LaTeX, Mathematica, MatLab, Python, Sage, Singular, basic HTML, basic JAVA and basic web design.

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#### SELECTED MEMBERSHIPS AND ADMINISTRATIVE DUTIES

##### **Membership in boards.**

- President of the Icelandic Mathematical Society, 2011-
- Member of the board of the Icelandic Mathematical Society, 2010

##### **Organization.**

- One of the organizers of a new undergraduate degree, *Discrete Mathematics and Computer Science*, at Reykjavik University, which opened in fall 2012

- Member of the organizing committee of FPSAC 2011
- Chair of the organizing committee of the conference Mathematics in Iceland 2011
- Co-organizer of the Icelandic Postdoc and Graduate Student Seminar, 2010

**Memberships.**

- American Mathematical Society, 2004-
- Icelandic Mathematical Society, 2004-
- Icelandic Centre of Excellence in Theoretical Computer Science, 2008-

**Other.**

- Referee work for journals: Journal of Combinatorial Theory – Series A, Discrete Mathematics, Journal of Integer Sequences, Discrete Applied Mathematics, Pure Mathematics and Applications, The Australasian Journal of Combinatorics, European Journal of Combinatorics, Journal of Combinatorics, The Electronic Journal of Combinatorics,
- Referee work for conferences: European Symposia on Algorithms 2011, Formal Power Series and Algebraic Combinatorics 2013
- Review work for MathSciNet
- Other referee work: Grant applications to the NSA Mathematical Sciences Program
- External examiner for final projects of B.Sc. students at Reykjavik University:
  - Developing Game AI for the Real-Time Strategy Game Starcraft, spring 2011 (three students)
  - Arduino as a Random Number Generator, fall 2011 (one student)

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**SELECTED AWARDS AND GRANTS**

- Scandinavia-Japan Sasakawa Foundation Grant to travel to Japan to attend FPSAC 2012
- Co-proposer on a 3 year grant of excellence from the Icelandic Research Fund, awarded December 2011
- Erasmus grant for visiting University of Strathclyde, Glasgow, UK, fall 2011
- George Irving Hopkins Fellowship, 2008-2009