

Curriculum Vitae

Ararat Harutyunyan

Personal:

Date of Birth: July 30, 1984, Yerevan, Armenia.

Citizenship: Canadian.

Languages: English (native fluency), Armenian (native fluency), French (advanced), Russian (intermediate).

Contact Details:

Affiliation: CIMI (Centre International de Mathématiques et Informatique) Research Fellow, Institut de Mathématiques de Toulouse, Université Toulouse

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Profile:

- 2015-2018* LabEx CIMI Research Fellow (Centre International de Mathématiques et Informatique de Toulouse)
- 10/2014 – 09/2015* Postdoctoral Researcher, Laboratoire de l'Informatique du Parallélisme, École Normale Supérieure de Lyon.
- 10/2013 – 10/2014* Postdoctoral Researcher, Mathematical Institute, University of Oxford.
- 10/2012 – 10/2013* Digiteo Postdoctoral Researcher, Université Paris-Sud, Paris, France.
- 09/2011 – 06/2012:* Postdoctoral Researcher and Instructor, Simon Fraser University, Vancouver, Canada.
- 09/2008 – 06/2011:* PhD, Simon Fraser University, Vancouver, Canada.
- 09/2006 – 08/2008:* MSc, McGill University, Montréal, Canada.
- 09/2003 – 08/2006:* BSc (Honours), McGill University, Montréal, Canada.

Ph.D Thesis:

Title: Brooks type results for coloring of digraphs.

Supervisor: Professor Bojan Mohar (*Canada Research Chair (Tier 1) in Graph Theory*).

Defense Date: June 6, 2011.

Defense Committee: Prof. Bojan Mohar (Senior Supervisor, SFU), Prof. Matt DeVos (Supervisor, SFU), Prof. Pavol Hell (**Internal Examiner**, *Managing editor of Journal of Graph Theory*, SFU), Prof. Bruce Reed (**External Examiner**, *Canada Research Chair (Tier 1) in Graph Theory*, McGill)

MSc. Thesis:

Title: Probabilistic Methods and Domination Related Problems in Graphs.

Supervisors: Professors Jacques Verstraete (UC San Diego) and Dmitry Jakobson (McGill U.)

Thesis Examiner: Professor Tibor Szabó (Berlin Free U.)

Offers and Awards Received:

2016: Tenure-track Assistant Professor, University of Saskatchewan, Canada (declined)

2015-2018: LabEx CIMI (Centre International de Mathematique et Informatique de Toulouse) Research Fellowship, (Equipe *Probabilité et Statistique*, Université Paul Sabatier)

2015-2017: LabEx Archimede Postdoctoral Scholarship, Laboratoire d'Informatique Fondamentale de Marseille, Aix-Marseille Université (declined).

2013-2015: FQRNT Postdoctoral Personal Grant, \$30,000/year (1st among 4 recipients).

2012-2013: Digiteo Postdoctoral Grant, Université Paris-Sud.

2012-2013: Postdoctoral Scholarship, ENS Lyon (declined).

2011: Nominated for best PhD Award in Science, Faculty of Science, Simon Fraser University.

2011: President's PhD Research Stipend, Simon Fraser University, \$6250.

2011: Graduate Fellowship, Simon Fraser University, \$6250.

2008-2011: FQRNT Doctoral Grant, \$20,000/year.

2006-2008: Research Assistantship, McGill University, \$9,000.

2004: NSERC Undergraduate Summer Research Award, \$6,000.

Research Interests:

My research interests are in discrete mathematics: graph theory, applications of discrete probability and graph algorithms. In particular, I am interested in structural, probabilistic and extremal graph theory, random graphs, discharging and probabilistic methods, combinatorial and randomized algorithms.

Journal Articles:

- [1] A. Harutyunyan, T.-N. Le, S. Thomassé, H. Wu, Coloring tournaments: from local to global, *Journal of Combinatorial Theory (Ser. B)*, submitted.
- [2] J. Bensmail, A. Harutyunyan, N.-K. Le, B. Li, N. Lichiardopol, Disjoint cycles of different lengths in graphs and digraphs, *Journal of Graph Theory*, submitted.
- [3] J. Bensmail, A. Harutyunyan, N.-K. Le, List coloring digraphs, *Journal of Graph Theory*, submitted.
- [4] J. Bensmail, A. Harutyunyan, T.-N. Le, S. Thomassé, Edge partitioning a graph into paths: beyond the Bárat-Thomassen Conjecture, *Combinatorica*, submitted.
- [5] A. Harutyunyan, L. Pastor, S. Thomassé, Disproving the normal graph conjecture, *Journal of Combinatorial Theory (Ser. B)*, submitted.
- [6] F. Foucaud, A. Harutyunyan, P. Hell, S. Legay, Y. Manoussakis, R. Naserasr, Tropical homomorphisms of graphs, *Discrete Applied Mathematics*, accepted.
- [7] J. Bensmail, A. Harutyunyan, T.-N. Le, M. Merker, S. Thomassé, A proof of the Bárat-Thomassen Conjecture, *Journal of Combinatorial Theory (Ser. B)*, in press.
- [8] A. Harutyunyan, B. Mohar, Planar digraphs of digirth five are 2-colorable, *Journal of Graph Theory*, in press; DOI: 10.1002/jgt.22032.
- [9] A. Harutyunyan, P. Horn and J. Verstraete, Independent dominating sets in graphs of girth five, *Combinatorics, Probability and Computing*, to appear.
- [10] J.A. Angles d'Auriac, N. Cohen, A. El Maftouhi, A. Harutyunyan, S. Legay and Y. Manoussakis, Tropical connected sets in graphs, *Discrete Mathematics and Theoretical Computer Science* 17:3, pp. 327–348, 2016.
- [11] A. Harutyunyan, R. Naserasr, M. Petrushevski, R. Skrekovski, Q. Sun, Planar graphs of odd girth 17 are homomorphic to the Coxeter graph, *Discrete Mathematics* 339, pp. 839 – 849, 2016.
- [12] A. Harutyunyan, S. Legay, Linear time algorithms for weighted offensive and powerful alliances in trees, *Theoretical Computer Science* 582, pp. 17–26, 2015.
- [13] H. El Maftouhi, A. Harutyunyan, Y. Manoussakis, Weak-balance in random graphs, *Internet Mathematics* 11(2), pp. 143–154, 2015.
- [14] J. Bensmail, A. Harutyunyan, H. Hocquard, P. Valicov, Strong edge colorings of planar graphs of girth 6, *Discrete Applied Mathematics* 179, pp. 229–234, 2014.
- [15] A. Harutyunyan, Global Offensive Alliances in Graphs and Random Graphs, *Discrete Applied Mathematics* 164, pp. 522–526, 2014.
- [16] A. Harutyunyan, Some bounds on global alliances in trees, *Discrete Applied Mathematics* 161(12): pp. 1739–1746, 2013
- [17] A. Harutyunyan, M. Kayll, B. Mohar and L. Rafferty, Uniquely D -colorable digraphs with large girth, *The Canadian Journal of Mathematics* 64, pp. 1310–1328, 2012.

- [18] A. Harutyunyan, B. Mohar, Planar graphs have exponentially many 3-arboricities, *SIAM Journal on Discrete Mathematics* (26)3: pp. 1269-1280, 2012.
- [19] A. Harutyunyan, B. Mohar, Two results on the digraph chromatic number, *Discrete Mathematics* 312(10), pp. 1823–1826, 2012.
- [20] A. Harutyunyan and B. Mohar, Gallai’s Theorem for List Coloring of Digraphs, *SIAM Journal on Discrete Mathematics* 25(1), pp. 170-180, 2011.
- [21] A. Harutyunyan and B. Mohar, Strengthening Brooks’ Theorem for Digraphs of Girth at least Three, *The Electronic Journal of Combinatorics* 18(1), #195, 2011.

- Conference Articles:**
- [1] A. Harutyunyan, Global Offensive Alliances in Graphs via Degree Sequences, VI Latin-American Algorithms, Graphs and Optimization Symposium (LAGOS 2011).
 - [2] A. Harutyunyan. A fast algorithm for powerful alliances in trees, 4th International Conference on Combinatorial Optimization and Applications (COCOA 2010), Kailua-Kona, HI, USA, **LNCS 6508** (1) 2010: 31-40.
 - [3] A. Harutyunyan, Some bounds on alliances in trees, 9th Cologne-Twente Workshop on Graphs and Combinatorial Optimization (CTW 2010), pp. 83–86.

Conference Talks:

- Proof of the Barat-Thomassen Conjecture, Bordeaux Graph Workshop, Bordeaux, France, November 7-10, 2016.
- Proof of the Barat-Thomassen Conjecture, SIAM conference on Discrete Mathematics, Atlanta, USA, June 6-10, 2016.
- Proof of the Barat-Thomassen Conjecture (**Invited talk**), Advanced Mathematics for Network Analysis, Luchon, France, May 1-4, 2016.
- Connections between colorings of graphs and digraphs, Spectrum of Random Graphs, CIRM, Marseille France, January 4-8, 2016
- A disproof of the Normal Graph Conjecture, Journées Graphes et Algorithmes, November 4-6, 2015, Orléans.
- Partitioning a graph into paths: beyond Barat-Thomassen Conjecture, Connections in Discrete Mathematics (in honor of Ron Graham’s 80th birthday), Vancouver, Canada, June 15-19, 2015.
- Balance in Random Graphs, Bordeaux Graphs Workshop, Bordeaux, France, November 19-22, 2014.
- Recent results in digraph colorings, SIAM conference on Discrete Mathematics, Minneapolis, USA, June 16 - 19, 2014.

- Some results on sparsity, high chromatic number and homomorphisms, Journées Graphes et Algorithmes (JGA 2013), Orsay, France, November 13-15, 2013.
- Some problems on the dichromatic number of digraphs, Utrecht Graphs Workshop, Utrecht, Netherlands, October 31 - November 1, 2013.
- Colorings and acyclic sets in planar graphs and digraphs, 2nd Bordeaux Graph Theory Workshop (BGW 2012), Bordeaux, France, November 21 - November 24, 2012.
- Gallai's Theorem for list coloring of digraphs, 3rd Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM) 2011, Victoria, Canada, May 31 - June 3, 2011.
- A fast algorithm for powerful alliances in trees, 4th International Conference on Combinatorial Optimization and Applications (COCOA 2010), Hawaii, USA, December 18-20, 2010.
- Some bounds on alliances in Trees, 9th Cologne-Twente Workshop on Graphs and Combinatorial Optimization (CTW 2010), Cologne, Germany, May 25-27, 2010.

Seminars and Presentations:

- List Coloring Digraphs, I3S seminar, Nice, February 2017.
- List Coloring Digraphs, G-SCOP seminar, Grenoble, January 2017.
- Proof of the Barat-Thomassen Conjecture, CWI, Amsterdam, April 2016.
- Proof of the Barat-Thomassen Conjecture, LIF seminar, Aix-Marseille Université, February, 2016.
- A disproof of the Normal Graph Conjecture, Probability Seminar, Mathematical Institute, Toulouse, December 2015.
- Some problems of colorings in graph and digraphs, Combinatorics seminar, University of Birmingham, February 2014.
- On the dichromatic number of digraphs, LIRMM seminar, Université Montpellier, September 2013.
- Coloring digraphs, LIP seminar, ENS Lyon, September 2013.
- Independent dominating sets in graphs by the semi-random method, LIAFA Graph theory and distributed algorithms seminar, Université Paris 7, January 2013.
- On the chromatic number of digraphs, LRI Seminar, Université Paris-Sud, June 2012.
- On the chromatic number of digraphs, Mascotte Seminar, Nice-Sophia Antipolis, May 2012.
- Vertex-arboricity of planar graphs, SFU Discrete Mathematics Seminar, Simon Fraser University, March 2012.

- On the digraph chromatic number, SFU Discrete Mathematics Seminar, Simon Fraser University, May 2011.
- Shuffling cards: How many shuffles are enough?, *Proofs from the Book seminar series*, Simon Fraser University, February 2011.
- Digraph Coloring, Interdisciplinary Research in the Mathematical and Computational Sciences Researchers Poster Session, Simon Fraser University, Vancouver, April 2010.
- Independent Dominating Sets in Graphs of girth five, SFU Discrete Mathematics Seminar, Simon Fraser University, Vancouver, March 2010.
- Concentration Inequalities for Random Variables, Centre de Recherches Mathématiques (CRM) seminar in Analysis and Mathematical Physics, McGill University, Montreal, November 2007.
- An Introduction to the Probabilistic Method, Centre de Recherches Mathématiques (CRM) seminar in Analysis and Probability, McGill University, Montreal, May 2007.
- Highly Irregular Graphs, Concordia Computational Combinatorial Optimization Laboratory Seminar (ConCoCO), Montreal, April 2007.

Referee Service: (I typically agree to review at least 5 papers a year)

- **Reviewer** for: Journal of Combinatorial Theory (Ser. B), SIAM Journal on Discrete Mathematics, Journal of Graph Theory, European Journal of Combinatorics, Electronic Journal of Combinatorics, Discrete Applied Mathematics, Discrete Mathematics, Discussiones Mathematicae Graph Theory, Information and Computation, Theoretical Computer Science

Other ongoing service:

- Organiser of the *Probability Theory Seminar* (with Jonas Kahn and Laurent Miclo), Mathematical Institute, University of Toulouse.

Student supervision/Thesis Committee Involvement:

- **Khang Le** (Master's student, ENS de Lyon, 01/2015 - 06/2015); **2 joint papers**
- During my one year stay at LRI, Université Paris-Sud, I co-supervised two PhD students:
 - **Sylvain Legay** (Ph.D) (student of Yannis Manoussakis); **3 joint papers**
 - **Jean-Alexandre Anglès D'Auriac** (Ph.D) (student of Yannis Manoussakis); **1 paper**
- **Principal examiner** of two Master's student defences in ENS de Lyon, 2015.

Teaching:

- 03/2016 – 05/2016: **Lecturer (Cours)** EISC 102 Une promenade dans le jardin de la théorie des graphes (pour les étudiants de l'ISAE (SUPAERO))
(Class size: 40 students)
- 01/2012 – 04/2012: **Lecturer** for
MACM 201 Discrete Mathematics II (for Computer Science students)
(Class size: 50 students), Simon Fraser University.
- 09/2011 – 12/2011: **Lecturer** for
MATH 150 Calculus I with Review
(Class size: 40 students), Simon Fraser University.
- 09/2010 – 12/2010: Teaching Assistant for
MATH 308 Linear Optimization, Simon Fraser University.
- 01/2010 – 04/2010: Teaching Assistant for
MATH 343 Algebra: Groups, Simon Fraser University.
- 09/2009 – 12/2009: Teaching Assistant for
MATH 345 Introduction to Graph Theory, Simon Fraser University.
- 09/2007 – 12/2007: Teaching Assistant for
MATH 141 Calculus II, McGill University.

The above teaching assistantships involved giving weekly tutorials, office hours, marking assignments and final exams. The class sizes have varied from 15 to over 50 students for different courses. The work involved for each of the teaching assistantships was evaluated as over 100 hours. The two courses that I lectured at SFU each had duration of 13 weeks, with 3 hours of lecture each week. The course at SUPAERO contained a total of 30 hours, 15 hours of which was tutorial (TD).

Miscellaneous:

- Erdős number: 2 (via a paper with Pavol Hell and the following paper)
P. Hell, P. Erdős and P. Winkler, Bandwidth versus bandsize, *Annals of Discrete Math.* 41, 117–130, 1989.

References:

Prof. Pavol Hell (Editor-In-Chief of *Journal of Graph Theory*)
Department of Computer Science
Simon Fraser University
Email: pavol@sfu.ca

Prof. Colin McDiarmid
Department of Statistics
University of Oxford
Email: cmcd@stats.ox.ac.uk

Prof. Bojan Mohar (Editor-In-Chief of *Journal of Combinatorial Theory Ser. B*,
Canada Research Chair (Tier 1))
Department of Mathematics
Simon Fraser University
Email: mohar@sfu.ca

Prof. Stéphane Thomassé
Laboratoire de l'Informatique du Parallélisme
Ecole Normale Supérieure de Lyon
Email: stephan.thomasse@ens-lyon.fr