

(b) At UBC

Rank or Title	Date
Associate Professor	July 1, 2015 - present
Canada Research Chair in Algorithm Design (Tier 2, 5 year appointment)	April 1, 2012 - March 31, 2017
Assistant Professor	June 1, 2011 - June 30, 2015

7. TEACHING*(a) Areas of special interest and accomplishments*

Computer science is a fast-paced field, and the course curricula need to be revised regularly to keep up with recent developments. I always aim to include modern material in the courses that I teach. My particular interests include algorithms, complexity, optimization, and connecting theory to applied areas such as machine learning.

(b) Courses Taught at UBC

Session	Course Number	Title	Scheduled Hours	Class Size
Summer 2016	CPSC 320	Intermediate Algorithm Analysis and Design	7.5/week	111
Summer 2015	CPSC 320	Intermediate Algorithm Analysis and Design	7.5/week	105
Winter 2015	CPSC 536N	Randomized Algorithms	3/week	19
Summer 2014	CPSC 221	Basic Data Structures and Algorithms	7.5/week	120
Winter 2014	CPSC 531H	Machine Learning Theory	3/week	15
Fall 2013	CPSC 421/501	Introduction to Theory of Computing	3/week	44
Winter 2013	CPSC 536N	Sparse Approximations	3/week	7
Fall 2012	CPSC 421/501	Introduction to Theory of Computing	3/week	43
Winter 2012	CPSC 536N	Randomized Algorithms	3/week	12

(c) Graduate Students Supervised

Student Name	Program Type	Year		Principal Supervisor
		Start	Finish	
Chris Liaw	Ph.D.-track M.Sc.	2015		Nicholas Harvey
Rebecca McKnight	M.Sc.	2013	2015	Nicholas Harvey
Zachary Drudi	M.Sc.	2012	2014	Nicholas Harvey
Samira Samadi	M.Sc.	2012	2014	Nicholas Harvey
Wai Shing (Isaac) Fung ²	Ph.D.	2009	2011	Nicholas Harvey

¹Isaac was my Ph.D. student at the University of Waterloo. He changed his principal supervisor to Jochen Könemann when I moved from Waterloo to UBC.

(d) Continuing Education Activities

2015 Distinguished Speaker¹, Institut d'Études Scientifiques de Cargèse. A 4-hour tutorial on low-stretch trees, matrix concentration and graph sparsification.

2015 Summer School Speaker, Summer School on Polyhedral Combinatorics. A 3-hour tutorial titled *Approximating Submodular Functions*.

2014 Tutorial Speaker, PIMS Summer School on Randomized Techniques for Combinatorial Algorithms. A 5-hour tutorial titled *Graph Sparsifiers and Random Matrices*.

2010 Tutorial Speaker, University of Waterloo Combinatorics and Optimization Summer School. A 1.5-hour tutorial titled *Partitioning sets to decrease the diameter*.

¹ Also listed under Keynote Speeches at Conferences.

(e) *Visiting Lecturer*

Course	University	Date(s)
Spectral Graph Theory and Numerical Linear Algebra (15-859N)	Carnegie Mellon University	Oct 7, 2011
Introduction to Graph Theory (MATH 4022)	Georgia Institute of Technology	December 2007

(f) *Other Supervision*

Postdoctoral Fellows Supervised at UBC

Student Name	Year		Supervisor(s)
	Start	Finish	
Abbas Mehrabian	2015	2017	Nicholas Harvey ¹

¹ The first 8 months were co-supervised with Petra Berenbrink at SFU.

Undergraduate Students Supervised at UBC

Student Name	Program Type	Year		Principal Supervisor
		Start	Finish	
Chris Liaw	Undergraduate Summer Research Assistant	2015	2015	Nicholas Harvey
Keyulu Xu	Work Learn Undergraduate Research Award	2014	2014	Nicholas Harvey

Selected Student Outcomes and Awards

Student Name	Outcome
Chris Liaw	NSERC CGSM (2016-18)
Keyulu Xu	Work Learn Undergraduate Research Award. Now a PhD student at MIT.
Samira Samadi	Research associate at University of Waterloo. Now a PhD student at Georgia Tech.

(g) *Courses Taught prior to coming to UBC*

Session	Institution	Course Number	Title	Scheduled Hours	Class Size
Winter 2011	University of Waterloo	CO 750	Randomized Algorithms	3/week	8
Fall 2010	University of Waterloo	CO 355	Mathematical Optimization	3/week	24
Winter 2010	University of Waterloo	CO 351	Network Flow Theory	3/week	20
Fall 2009	University of Waterloo	CO 355	Mathematical Optimization	3/week	11

8. SCHOLARLY AND PROFESSIONAL ACTIVITIES

(a) *Areas of special interest and accomplishments*

My research spans a wide range of topics in algorithm design, from highly theoretical questions near the boundary of pure mathematics, to practical innovations that are used in commercial products.

Combinatorial Optimization. *Goal:* analyzing the computational complexity of foundational problems on graphs and other combinatorial objects. *Key contributions:* the fastest known algorithm for non-bipartite matching in dense non-bipartite graphs. *Impact:* 12 papers [C1, C10, C11, C13, C17, C18, C25, J5, J6, J9, J10, T4].

Sparse Approximations of Data. *Goal:* designing probabilistic summaries of graphs and data

streams that preserve structural and statistical properties. *Key contributions*: the fastest known algorithm to approximate a graph while preserving its cuts; the most space-efficient algorithm for estimating entropy of a data stream. *Impact*: 7 papers [C7, C8, C12, O3, T2, T3, J2, J3].

Machine Learning Theory. *Goal*: rigorous analysis and algorithm design for problems arising in machine learning. *Key contributions*: models for learning real-valued functions with multiplicative guarantees; rigorous analysis of herding. *Impact*: 4 papers [C6, C9, O2, S3].

Applications of Theory to Systems and Networking. *Goal*: using modern algorithmic ideas to enable novel functionality in computer systems and networks. *Key contributions*: the first peer-to-peer system to incorporate locality into its structure; the only space-efficient method for estimating miss-ratio curves. *Impact*: 16 papers [C3, C4, C15, C16, C19, C20, C22, C24, C25, C26, C27, C28, J10, J11, J12, C3, T5, T6], 4 patents [P1, P3, P5, P6].

(b) *Research or equivalent grants (indicate under COMP whether grants were obtained competitively (C) or non-competitively (NC))*

Agency	Title	Comp	\$/Year	Year(s)	PIs
NSERC Discovery	Algorithms: Sparsification and Applications	C	\$36,000	2016-2021	Nicholas Harvey
PIMS CRG	Algorithmic Theory of Networks ¹	C	\$40,000	2012-2015	Berenbrink, Ergun, King
NSERC Discovery	Combinatorial optimization and communication networks	C	\$29,000	2009-2015	Nicholas Harvey
Alfred P. Sloan Foundation ²		C	\$25,000	2013-2015	Nicholas Harvey
UBC Startup		NC	\$80,000	2011	Nicholas Harvey

¹ This funding is for a collaborative research group that spans many universities. Nicholas Harvey is one of 8 co-organizers, to whom no funds are directly allocated.

² Also listed under Awards for Scholarship.

(c) *Invited Presentations*

Invited tutorials are instead listed in Section 7(d), and keynote addresses in Section 8(d). International presentations are denoted with an earth logo.

Intl	Venue	Location	Event
2015			
	UBC	Vancouver, BC	Probability Seminar
	UBC	Vancouver, BC	Discrete Math Seminar
🌐	Microsoft Research	Redmond, WA	Theory Seminar
🌐	University of Washington	Seattle, WA	Theory Seminar
🌐	École Polytechnique Fédérale de Lausanne	Lausanne, Switzerland	Theory Seminar
🌐	Intl. Symposium on Math. Programming	Pittsburgh, PA	Session on “The Lovász Local Lemma”
🌐	McGill Bellairs Research Institute	Barbados	Workshop on Combinatorial Optimization
🌐	Mathematical Sciences Research Institute	Berkeley, CA	Workshop on “Kadison-Singer, Interlacing Polynomials, and Beyond”
🌐	Mathematical Sciences Research Institute	Berkeley, CA	Workshop on “Kadison-Singer, Interlacing Polynomials, and Beyond”
🌐	AMS-MAA Joint Mathematics Meetings	San Antonio, TX	Session on “Concentration Inequalities for Random Matrices: Theory and Applications”

2014

- | | | |
|-------------------------------------|---------------|---|
| ☞ Microsoft Research | Redmond, WA | Theory Group Seminar |
| ☞ National Institute of Informatics | Shonan, Japan | Workshop on Algorithms for Large Scale Graphs |
| ☞ University of Chicago | Chicago, IL | CS Theory Seminar |

2013

- | | | |
|--------------------------------------|----------------|--------------------------------------|
| ☞ Microsoft Research | Redmond, WA | Theory Group Seminar |
| ☞ McGill Bellairs Research Institute | Barbados | Workshop on Approximation Algorithms |
| University of Victoria | Victoria, BC | Pacific Northwest Theory Day |
| ☞ University of Warsaw | Warsaw, Poland | Algorithms Seminar |
| University of Alberta | Edmonton, AB | Functional Analysis Seminar |

2012

- | | | |
|--|-------------------|--|
| ☞ IEEE FOCS Workshop | New Brunswick, NJ | Randomized Numerical Linear Algebra: Theory and Practice |
| Simon Fraser University | Burnaby, BC | Discrete Math Seminar |
| UBC | Vancouver, BC | Operations and Logistics Seminar |
| ☞ Intl. Symposium on Math. Programming | Berlin, Germany | Session on "Flows, Cuts and Sparsifiers" |

2011

- | | | |
|--------------------------------------|----------------|--|
| UBC | Vancouver, BC | Scientific Comp. and Applied & Indust. Math. Seminar |
| ☞ University of Washington | Seattle, WA | Computer Science Theory Seminar |
| ☞ Georgia Institute of Technology | Atlanta, GA | Algorithms and Randomness Center Seminar |
| ☞ Carnegie Mellon University | Pittsburgh, PA | School of Computer Science Theory Seminar |
| University of British Columbia | Vancouver, BC | Theory Seminar |
| ☞ Google Research | New York, NY | Theory Seminar |
| ☞ Institute for Advanced Study | Princeton, NJ | Mathematics Seminar |
| ☞ McGill Bellairs Research Institute | Barbados | Workshop on Approximation Algorithms |
| ☞ University of Michigan | Ann Arbor, MI | Computer Science Theory Seminar |

2010

- | | | |
|--------------------------------------|-----------------|---|
| ☞ Inst. for Pure and Applied Math. | Los Angeles, CA | Modern Trends in Optimization and Its Application |
| University of Waterloo | Waterloo, ON | Tutte Seminar |
| ☞ Research Inst. for Math. Sciences | Kyoto, Japan | Discrete Optimization Seminar |
| ☞ SIAM Discrete Math Conference | Austin, TX | Minisymposium on Submodular Functions |
| ☞ McGill Bellairs Research Institute | Barbados | Workshop on Approximation Algorithms |
| University of Waterloo | Waterloo, ON | Computer Science Club |

2009

- | | | |
|--------------------------------|---------------|-------------------------------------|
| ☞ University of Buffalo | Buffalo, NY | Eastern Great Lakes Theory Workshop |
| ☞ Institute for Advanced Study | Princeton, NJ | Mathematics Seminar |

2008

- | | | |
|-------------------------------------|-----------------|--|
| ☞ Research Inst. for Math. Sciences | Kyoto, Japan | Workshop on Combinatorial Optimization and Discrete Algorithms |
| ☞ IEEE Information Theory Workshop | Porto, Portugal | Invited Session on Computer Science |

2007

- | | | |
|-----------------------------------|----------------|------------------------------------|
| ☞ Georgia Institute of Technology | Atlanta, GA | ACO Seminar |
| ☞ Carnegie Mellon University | Pittsburgh, PA | Theory/Operations Research Seminar |
| ☞ Tsinghua University | Beijing, China | China Theory Week |
| ☞ Brown University | Providence, RI | Computer Science Theory Seminar |

☞ Yale University	New Haven, CT	Cowles Foundation Workshop on Optimization
2006		
☞ Dartmouth University	Hanover, NH	Computer Science Theory Seminar
☞ Stanford University	Palo Alto, CA	Algorithms Seminar
☞ Lucent Bell Labs	New Providence, NJ	Math. and Algorithmic Sciences Research Center
☞ Research Inst. for Math. Sciences	Kyoto, Japan	Discrete Optimization Seminar
☞ Princeton University	Princeton, NJ	Department of Computer Science
☞ Intl. Symposium on Math. Programming	Rio de Janeiro, Brazil	Graphs and Matroids Session
☞ Amazon.com	Seattle, WA	Algorithms Seminar
University of Waterloo	Waterloo, ON	Combinatorics and Optimization Seminar
☞ IBM T.J. Watson Research Center	Yorktown Heights, NY	Algorithms and Theory Group
2005		
☞ Princeton University	Princeton, NJ	Workshop on Flexible Network Design
☞ Tokyo University	Tokyo, Japan	Department of Mathematical Engineering Seminar
☞ Kyoto University	Kyoto, Japan	School of Informatics
☞ University of Illinois	Urbana-Champaign, IL	Allerton Conference
☞ Microsoft Research	Seattle, WA	Theory Group Seminar
2003		
☞ University of Washington	Seattle, WA	Computer Science Theory Seminar
☞ ICSI Center for Internet Research (ICIR)	Berkeley, CA	Networking Seminar

(d) *Conference Participation (Organizer, Keynote Speaker, etc.)*

Conference Organization

Year	Venue	Title
2017	Simons Institute	Bridging Continuous and Discrete Optimization

Workshop Organization

Year	Venue	Title
2016	Banff International Research Station	Algebraic and Spectral Graph Theory
2015	International Symposium on Mathematical Programming	Session on the Lovász Local Lemma
2015	Bellairs Research Institute	Discrepancy and Modern Rounding
2015	Banff International Research Station	Towards a Unified Treatment of Dynamic Graphs
2013	IEEE Symposium on Foundations of Computer Science	Zeros of Polynomials and their Applications to Theory

Keynote Speeches at Conferences

Year	Title	Venue	Event
2015	Distinguished Speaker	Institut d'Études Scientifiques de Cargèse	Sixth Workshop on Combinatorial Optimization
2013	Plenary Speaker	Fields Institute	6th Workshop on Flexible Network Design

9. SERVICE TO THE COMMUNITY

- (a) Memberships on scholarly societies, including offices held and dates
- (b) Memberships on other societies, including offices held and dates
- (c) Memberships on scholarly committees, including offices held and dates
- (d) Memberships on other committees, including offices held and dates
- (e) Editorships (list journal and dates)

Journal	Position	Years
ACM Transactions on Algorithms	Associate Editor	2015-2021

- (f) Reviewer (journal, agency, etc., including dates)

Program Committees

In top-tier conferences in theoretical computer science, the program committee members typically manage 40 papers, solicit reviews from subreviewers, moderate discussions, and recommend acceptance or rejection for each paper. Serving on the program committee for FOCS, SODA, etc., is a prestigious position, analogous to serving on a journal's editorial board.

Year	Conference Name
2017	ACM Symposium on the Theory of Computation (STOC)
2017	Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM)
2016	ACM-SIAM Symposium on Discrete Algorithms (SODA)
2015	International Workshop on Randomization and Computation (RANDOM)
2013	Theory and Applications of Models of Computation (TAMC)
2013	ACM-SIAM Symposium on Discrete Algorithms (SODA)
2010	IEEE Symposium on Foundations of Computer Science (FOCS)

Journal Reviews

ACM Transactions on Algorithms
 American Mathematical Monthly
 Discrete Applied Mathematics
 Discrete Mathematics
 Foundations and Trends in Theoretical Computer Science
 Geometric and Functional Analysis
 IEEE/ACM Transactions on Networking
 IEEE Communications Letters
 IEEE Transactions on Information Theory
 IEEE Transactions on Parallel and Distributed Systems
 Information and Computation
 International Mathematics Research Notices
 Journal of the ACM
 Journal of Algorithms
 Mathematics of Operations Research
 SIAM Journal on Computing
 SIAM Journal on Discrete Mathematics
 SIAM Journal on Matrix Analysis and Applications
 Telecommunication Systems
 Theoretical Computer Science

 Theory of Computation

Conference Reviews

I have reviewed papers for various conferences, typically 1 or 2 papers per conference.

 ACM-SIAM Symposium on Discrete Algorithms
 ACM SIGACT-SIGOPS Symposium on Principles of Distributed Computing
 ACM Symposium on Parallelism in Algorithms and Architectures
 ACM Symposium on Theoretical Computer Science
 Conference on Integer Programming and Combinatorial Optimization
 Data Compression Conference
 European Symposium on Algorithms
 IEEE Conference on Computational Complexity
 IEEE International Parallel & Distributed Processing Symposium
 IEEE International Symposium on High Performance Distributed Computing
 IEEE Symposium on Foundations of Computer Science
 IEEE Symposium on Information Theory
 Integer Programming and Combinatorial Optimization
 International Conference on Automata, Languages and Programming
 International Conference on Machine Learning
 International Symposium on Mathematical Foundations of Computer Science
 Latin American Theoretical Informatics Symposium

Grant Reviews I have reviewed grants for the Israel Science Foundation under the Individual Research Grant program.

(g) *External examiner (indicate universities and dates)*

University	Degree	Supervisor	Student	Date
Simon Fraser University	Ph.D.	Petra Berenbrink	Hoda Akbari	November 20, 2014

University Examiner (at UBC)

Department	Degree	Supervisor	Student	Date
Mathematics	Ph.D.	Brian Marcus	Raimundo Briceno Dominguez	July 22, 2016
Mathematics	Ph.D.	Akos Magyar	Tatchai Titichetrakun	April 14, 2016
Computer Science	Ph.D.	Joel Friedman	Alice Izsak	November 19, 2015
Computer Science	Ph.D.	Uri Ascher	Farbod Roosta-Khorasani	March 27, 2015
Mathematics	Ph.D.	Malabika Pramanik	Edward Kroc	March 20, 2015

(h) *Consultant (indicate organization and dates)*

Company	Role	Year		Description
		Start	Finish	
Microsoft Research	Consulting researcher	2015	2015	Research in the theory group.
Coho Data, Inc.	Algorithm consultant	2013	2015	A Vancouver-based startup company developing high-performance enterprise storage.
Troglo, Inc.	Adviser	2013	2013	A Calgary-based startup company developing a marketing platform integrated into wireless access points.

(i) *Other service to the community*

10. AWARDS AND DISTINCTIONS

(a) *Awards for Teaching (indicate name of award, awarding organizations and date)*

- UBC Computer Science Department Teaching Award, 2014.
- UBC Computer Science Department Teaching Award, 2012.

(c) *Awards for Scholarship (indicate name of award, awarding organizations and date)*

- Alfred P. Sloan Research Fellowship, 2013. Also listed under competitive research grants.
- Canada Research Chair (Tier 2) in Algorithm Design, April 2012. This award brings \$500,000 to UBC over five years.
- Best Student Paper Award (“Machtley Award”), 2006. Awarded annually to the best paper authored by a student at IEEE Symposium on Foundations of Computer Science.
- NSERC Post Graduate Scholarship PGS-D, 2005, For Tenure Abroad.
- NSERC Canada Graduate Scholarship, 2005. (Declined).
- NSERC Canada Graduate Scholarship, 2004. (Declined).
- MIT Presidential Graduate Fellowship, 2003-04.
- USITS Best Paper Award, 2003. Awarded annually to the best paper at the USENIX Symposium on Internet Technologies and Systems.
- NSERC Post Graduate Scholarship PGS-M, 2000, For Tenure Abroad. (Declined).
- Combinatorics and Optimization Book Prize, University of Waterloo, 2000.
- Rene Descartes Entrance Scholarship, University of Waterloo, 1995.

THE UNIVERSITY OF BRITISH COLUMBIA
Publication Record

SURNAME: Harvey








Date: August 24, 2016

FIRST NAME: Nicholas

MIDDLE NAME: James Alexander

1. REFEREED PUBLICATIONS






(a) *Archival, Rigorously Refereed Conference Proceedings*

-  [C1] Nicholas J. A. Harvey and **Keyulu Xu**. Generating random spanning trees via fast matrix multiplication. In *Proceedings of the Latin American Theoretical Informatics Symposium (LATIN)*, April 2016.
-  [C2] Nicholas J. A. Harvey and Jan Vondrák. An algorithmic proof of the Lovász local lemma via resampling oracles. In *IEEE Symposium on Foundations of Computer Science (FOCS)*, October 2015. Acceptance rate 27% = 86/314. Conference version of [S2] and [T1].
-  [C3] **Zachary Drudi**, Nicholas J. A. Harvey, Stephen Ingram, Andrew Warfield, and Jake Wires. Approximating miss ratio curves using streaming algorithms. In *17th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX)*, August 2015. Acceptance rate 42% = 26/61. Related to patent [P1].
-  [C4] Jake Wires, Stephen Ingram, **Zachary Drudi**, Nicholas J. A. Harvey, and Andrew Warfield. Characterizing storage workloads with counter stacks. In *11th USENIX Symposium on Operating Systems Design and Implementation (OSDI)*, October 2014. Acceptance rate 18% = 42/228. Related to patent [P1] and article [O1].
-  [C5] Nicholas J. A. Harvey, Roy Schwartz, and Mohit Singh. Discrepancy without partial coloring. In *17th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX)*, September 2014. Acceptance rate \approx 48%.
-  [C6] Nicholas J. A. Harvey and **Samira Samadi**. Near-optimal herding. In *Conference on Learning Theory (COLT)*, June 2014. Acceptance rate 28% = 38/136.
- ★  [C7] Nicholas J. A. Harvey and Neil Olver. Pipe rounding, pessimistic estimators, and matrix concentration. In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, January 2014. Acceptance rate 28% = 136/485.
- ★ [C8] **Wai Shing Fung**, Ramesh Hariharan, Nicholas J. A. Harvey, and Debmalya Panigrahi. A general framework for graph sparsification. In *ACM Symposium on Theory of Computing (STOC)*, June 2011. Acceptance rate 28% = 84/304.
- [C9] Maria-Florina Balcan and Nicholas J. A. Harvey. Learning submodular functions. In *ACM Symposium on Theory of Computing (STOC)*, June 2011. Acceptance rate 28% = 84/304. Conference version of [S3].
- [C10] Michel X. Goemans, Nicholas J. A. Harvey, Satoru Iwata, and Vahab Mirrokni. Approximating submodular functions everywhere. In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, January 2009. Acceptance rate 29% = 135/458.

- [C11] Takehiro Ito, Erik D. Demaine, Nicholas J. A. Harvey, Christos H. Papadimitriou, Martha Sideri, Ryuhei Uehara, and Yushi Uno. On the complexity of reconfiguration problems. In *International Symposium on Algorithms and Computation (ISAAC)*, December 2008. Acceptance rate 34% = 78/229. Conference version of [J7].
- [C12] Nicholas J. A. Harvey, Jelani Nelson, and Krzysztof Onak. Sketching and streaming entropy via approximation theory. In *IEEE Symposium on Foundations of Computer Science (FOCS)*, October 2008. Acceptance rate 29% = 79/276. Conference version of [O3].
- [C13] Nicholas J. A. Harvey. Matroid intersection, pointer chasing, and Young's seminormal representation of S_n . In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, January 2008. Acceptance rate 30% = 135/455.
- [C14] John Dunagan and Nicholas J. A. Harvey. Iteratively constructing preconditioners via the conjugate gradient method. In *ACM Symposium on Theory of Computing (STOC)*, June 2007. Acceptance rate 25% = 78/312.
- [C15] Nicholas J. A. Harvey, Robert D. Kleinberg, Chandra Nair, and Yunnan Wu. A "chicken & egg" network coding problem. In *IEEE International Symposium on Information Theory (ISIT)*, June 2007. Acceptance rate 61% = 603/993.
- [C16] Nicholas J. A. Harvey, Mihai Pătraşcu, Yonggang Wen, Sergey Yekhanin, and Vincent W. S. Chan. Non-adaptive fault diagnosis for all-optical networks via combinatorial group testing on graphs. In *IEEE Conference on Computer Communications (INFOCOM)*, May 2007. Acceptance rate \approx 18%.
- [C17] Nicholas J. A. Harvey. An algebraic algorithm for weighted linear matroid intersection. In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, January 2007. Acceptance rate 36% = 139/382.
- [C18] Nicholas J. A. Harvey. Algebraic structures and algorithms for matroid and matching problems. In *IEEE Symposium on Foundations of Computer Science (FOCS)*, October 2006. Acceptance rate 29% = 71/243. Conference version of [J9].
- [C19] Micah Adler, Erik D. Demaine, Nicholas J. A. Harvey, and Mihai Pătraşcu. Lower bounds for asymmetric communication channels and distributed source coding. In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, January 2006. Acceptance rate 31% = 135/440.
- [C20] Micah Adler, Nicholas J. A. Harvey, Kamal Jain, Robert D. Kleinberg, and April R. Lehman. On the capacity of information networks. In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, January 2006. Acceptance rate 31% = 135/440. Conference version of [J11].
- [C21] Nicholas J. A. Harvey, David R. Karger, and Sergey Yekhanin. The complexity of matrix completion. In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, January 2006. Acceptance rate 31% = 135/440.
- [C22] Nicholas J. A. Harvey, David R. Karger, and Kazuo Murota. Deterministic network coding by matrix completion. In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, January 2005. Acceptance rate 28% = 135/488.
- [C23] John Dunagan, Nicholas J. A. Harvey, Michael B. Jones, Dejan Kostić, Marvin Theimer, and Alec Wolman. FUSE: Lightweight guaranteed distributed failure notification. In *Symposium on Operating System Design and Implementation (OSDI)*, December 2004. Acceptance rate 14% = 27/193. Related to patent [P4].

- [C24] Kevin Zatloukal and Nicholas J. A. Harvey. Family Trees: An ordered dictionary with optimal congestion, locality, degree, and search time. In *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, January 2004. Acceptance rate 30% = 135/455.
- [C25] Nicholas J. A. Harvey, László Lovász, Richard Ladner, and Tami Tamir. Semi-matchings for bipartite graphs and load balancing. In Frank K. H. A. Dehne, Jörg-Rüdiger Sack, and Michiel H. M. Smid, editors, *Algorithms and Data Structures, 8th International Workshop (WADS)*, volume 2748 of *LNCS*. Springer, July 2003. Conference version of [J10]. Related to patent [P5].
- [C26] Nicholas J. A. Harvey and J. Ian Munro. Deterministic SkipNet. In *ACM Symposium on Principles of Distributed Computing (PODC)*, July 2003. Conference version of [J12].
- ★ [C27] Nicholas J. A. Harvey, Michael B. Jones, Stefan Saroiu, Marvin Theimer, and Alec Wolman. SkipNet: A scalable overlay network with practical locality properties. In *USENIX Symposium on Internet Technologies and Systems (USITS)*, March 2003. Acceptance rate 28% = 21/76. Related to patent [P3] and technical report [T6].
- [C28] Nicholas J. A. Harvey, Michael B. Jones, Marvin Theimer, and Alec Wolman. Efficient recovery from organizational disconnects in SkipNet. In Frans Kaashoek and Ion Stoica, editors, *Peer-to-Peer Systems II: Second International Workshop (IPTPS)*, volume 2735 of *LNCS*, pages 183–196. Springer, February 2003. Acceptance rate 16% = 27/166.

(b) *Refereed Journals*

-  [J1] Nicholas J. A. Harvey and **Christopher Liaw**. Rainbow hamilton cycles and lopsidedependency. *Discrete Mathematics*. 13 pages. Accepted August 2016.
-  [J2] **Marcel de Carli Silva**, Nicholas J. A. Harvey, and **Cristiane Sato**. Sparse sums of positive semi-definite matrices. *ACM Transactions on Algorithms*, 12(1), December 2015. 16 pages.
-  [J3] Nicholas J. A. Harvey. A note on the discrepancy of matrices with bounded row and column sums. *Discrete Mathematics*, 338:517–521, April 2015.
-  [J4] Nicholas J. A. Harvey. A generalization of the Cauchy-Schwarz inequality involving four vectors. *Journal of Mathematical Inequalities*, 9(2):489–491, June 2015.
-  [J5] Erik D Demaine, Martin L Demaine, Nicholas J. A. Harvey, Ryuhei Uehara, Takeaki Uno, and Yushi Uno. UNO is hard, even for a single player. *Theoretical Computer Science*, 521:51–61, February 2014.
- [J6] Nicholas J. A. Harvey, Tamás Király, and Lap Chi Lau. On disjoint common bases in two matroids. *SIAM Journal on Discrete Mathematics*, 25(4):1792–1803, 2011.
- [J7] Takehiro Ito, Erik D. Demaine, Nicholas J. A. Harvey, Christos H. Papadimitriou, Martha Sideri, Ryuhei Uehara, and Yushi Uno. On the complexity of reconfiguration problems. *Theoretical Computer Science*, 412(12-14):1054–1065, 2011. Journal version of [C11].
- [J8] Nicholas J. A. Harvey. Query lower bounds for matroid intersection. *RIMS Kokyuroku Bessatsu*, 23:81–105, 2010.
- ★ [J9] Nicholas J. A. Harvey. Algebraic algorithms for matroid and matching problems. *SIAM Journal on Computing*, 39(2):679–702, 2009. Journal version of [C18].
- [J10] Nicholas J. A. Harvey, László Lovász, Richard Ladner, and Tami Tamir. Semi-matchings for bipartite graphs and load balancing. *Journal of Algorithms*, 59(1):53–78, 2006. Journal version of [C25]. Related to patent [P5].

- [J11] Nicholas J. A. Harvey, Robert D. Kleinberg, and April R. Lehman. On the capacity of information networks. *IEEE Transactions on Information Theory*, 52(6):2345–2364, 2006. Journal version of [C20].
- [J12] Nicholas J. A. Harvey and J. Ian Munro. Deterministic SkipNet. *Information Processing Letters*, 90(4):205–208, 2004. Journal version of [C26].

(c) *Other: Nonarchival and/or Less Rigorously Refereed Publications*



[O1] Jake Wires, Stephen Ingram, **Zachary Drudi**, Nicholas J. A. Harvey, and Andrew Warfield. Counter stacks and the elusive working set. *login: the Usenix magazine*, 40(1), February 2015.



[O2] Maria-Florina Balcan, Nicholas J. A. Harvey, and Satoru Iwata. Learning symmetric non-monotone submodular functions. In *NIPS Workshop on Discrete Optimization in Machine Learning*, December 2012.

[O3] Nicholas J. A. Harvey, Jelani Nelson, and Krzysztof Onak. Streaming algorithms for estimating entropy. In *IEEE Information Theory Workshop (ITW)*, May 2008. Preliminary version of [C12].

[O4] Petar Maymounkov, Nicholas J. A. Harvey, and Desmond Lun. Methods for efficient network coding. In *Allerton Conference on Communication, Control, and Computing*, September 2006.

[O5] Nicholas J. A. Harvey, Kamal Jain, Lap Chi Lau, Chandra Nair, and Yunnan Wu. Conservative network coding. In *Allerton Conference on Communication, Control, and Computing*, September 2006.

[O6] Nicholas J. A. Harvey and Robert Kleinberg. Tighter cut-based bounds for k -pairs communication problems. In *Allerton Conference on Communication, Control, and Computing*, September 2005.

[O7] Nicholas J. A. Harvey and Kevin Zatloukal. The post-order heap. In *International Conference on Fun with Algorithms (FUN)*, May 2004.

2. NON-REFEREED PUBLICATIONS

(a) *Technical Reports*



[T1] Nicholas J. A. Harvey and Jan Vondrák. An algorithmic proof of the Lovász local lemma via resampling oracles. arXiv:1504.02044 [cs.DS]. 47 pages. Submitted November 2015. Extended version of [C2] and [S2].



[T2] Nicholas J. A. Harvey. An introduction to the Kadison-Singer problem and the paving conjecture. Technical report, 2013.

[T3] **Wai Shing Fung** and Nicholas J. A. Harvey. Graph sparsification by edge-connectivity and random spanning trees. arXiv:0909.0941 [cs.DS], 2010. Related to conference publication [C8].

[T4] Michel X. Goemans, Nicholas J. A. Harvey, Kamal Jain, and Mohit Singh. A randomized rounding algorithm for the asymmetric traveling salesman problem. arXiv:0909.0941 [cs.DS], 2009.

[T5] Nicholas J. A. Harvey, Robert D. Kleinberg, and April R. Lehman. Comparing network coding with multicommodity flow for the k -pairs communication problem. Technical Report MIT-LCS-TR-964, 2004.

- [T6] John Dunagan, Nicholas J. A. Harvey, Michael B. Jones, Stefan Saroiu, Marvin Theimer, and Alec Wolman. SkipNet: A scalable overlay network with practical locality properties. Microsoft Technical Report MSR-TR-2002-92, 2002. Related to publications [C27, C28] and patent [P3].

3. PATENTS



- [P1] **Zachary Drudi**, Nicholas J. A. Harvey, Stephen Ingram, Andrew Warfield, and Jake Wires. Systems, methods, and devices for determining locality in data stream and conversions thereof. Provisional application #61/987,234 filed May 1, 2014. Related to publications [C3, C4].
- [P2] Jeffrey B. Parham, Levon A. Esibov, Nicholas J. Harvey, and William B. Lees. Generalized proximity service. US Patents 8,145,699 (March 27, 2012) and 8,250,220 (August 21, 2012).
- [P3] Nicholas J. Harvey, Michael B. Jones, Stefan Saroiu, Marvin M. Theimer, Alastair Wolman, and Atul Adya. System and method for creating improved overlay network with an efficient distributed data structure. US Patent 7,613,796 (November 3, 2009) and European Patent 1398924 (June 25, 2008). Related to publication [C27] and technical report [T6].
- [P4] John Dunagan, Nicholas J. A. Harvey, Michael B. Jones, Dejan Kostić, Marvin M. Theimer, and Alec Wolman. Method for providing guaranteed distributed failure notification. US Patent 7,551,552 (June 23, 2009). Related to publication [C23].
- [P5] Nicholas Harvey and László Lovász. Method and system for matching network clients and servers under matching constraints. US Patent 7,165,103 (January 16, 2007). Related to publications [C25, J10].
- [P6] Jeffrey B. Parham, Mark R. Brown, William B. Lees, Van H. Vu, László Lovász, Nicholas J. A. Harvey, and Katalin Vesztergombi. Method for designating communication paths in a network. US Patents 6,879,564 (April 12, 2005) and 7,499,413 (March 3, 2009).
- [P7] John Dunagan, Nicholas J. A. Harvey, Michael B. Jones, Marvin M. Theimer, and Alec Wolman. Scalable, fault-tolerant, event notification method. US Patent Application 20050086469. Filed October 16, 2003.

4. WORK SUBMITTED



- [S1] Nicholas J. A. Harvey, Piyush Srivastava, and Jan Vondrák. Computing the independence polynomial in Shearer's region for the LLL, July 2016. Submitted to the ACM-SIAM Symposium on Discrete Algorithms (SODA).



- [S2] Nicholas J. A. Harvey and Jan Vondrák. An algorithmic proof of the Lovász local lemma via resampling oracles. *Journal of the Association for Computing Machinery (JACM)*. 34 pages. Submitted December 2015. Journal version of [C2] and [T1].



- [S3] Maria-Florina Balcan and Nicholas J. A. Harvey. Submodular functions: Learnability, structure, and optimization. *SIAM Journal on Computing*. 48 pages. Submitted on August 22, 2012. Journal version of [C9].