

NATASHA DEVROYE

- POSITION HELD** Assistant Professor January 2009 onwards
Department of Electrical and Computer Engineering
University of Illinois at Chicago *Voice: (312) 996-1013*
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Chicago, IL 60607-7053 USA *www: http://www.ece.uic.edu/~devroye*
- PERSONAL** Born May 1980, citizen of Canada and Belgium, fluent in English, French, Flemish
- EDUCATION** **Harvard University** Cambridge, MA, US
School of Engineering and Applied Sciences June 2007
Ph.D. in Engineering Sciences
Thesis: Information Theoretic Limits of Cognition and Cooperation in Wireless Networks
Advisor: Professor Bahram Tavakoli, *bahram@seas.harvard.edu*
- McGill University** Montreal, QC, Canada
Dept. of Electrical and Computer Engineering December 2001
B.Eng (Honours) in Electrical Engineering
GPA: 3.97/4.0, Specialization: Communications
Thesis: Implementation of the image compression algorithm EBCOT in C++
Advisor: Professor Fabrice Labeau, *flabeau@ece.mcgill.ca*
- RESEARCH INTERESTS** **Information theory:** Multi-user information theory and network capacity, channel coding, multiplexing/diversity gains, channels with side-information, network coding, bi-directional relaying.
- Cognitive and cooperative communications:** Wireless communications, cognitive radio, dynamic spectrum access, scaling laws, protocol design, scheduling, resource allocation, optimization, implementation of cognitive networks. Cooperative protocols for encoding/decoding/sensing. Applications to power-line communications.
- Signal processing:** Linear pre-coding and decoding, detection, estimation, image compression. Applications to bio-medical image/signal processing.
- RESEARCH EXPERIENCE** **University of Illinois at Chicago** Chicago, IL, US
Assistant Professor January 2009 onwards
Independent and collaborative research with colleagues, students, visiting scholars. Grant writing, graduate student supervision.
- Harvard University** Cambridge, MA, US
Lecturer/Post-doctoral Fellow July 2007 - June 2008
Independent and collaborative research with Harvard professors, students, visiting scholars. Organize weekly group seminars, invite and host speakers, aid in grant writing.
- Mitsubishi Electric Research Laboratories** Cambridge, MA, USA
Fundamental research intern July 2006 - December 2006
Headed new direction of independent research in MERL's Cooperative Communications project.
Supervisor: Andreas F. Molisch, *molisch@merl.com*

Intel Research*Summer research intern*

Evaluated gains of cooperation in wireless 802.16 cellular networks.

Supervisor: Sumeet Sandhu, *sumeet.sandhu@intel.com*

Santa Clara, CA, US

June 2005 - August 2005

Harvard University*Research Assistant*

Included Ph.D. research, Ph.D. and Masters level coursework, grant writing, reviewing, contributing numerous invited journal papers and book chapters.

Cambridge, MA, US

September 2002 - June 2007

TEACHING
EXPERIENCE**University of Illinois at Chicago***Assistant Professor*

- ECE 534, Elements of Information Theory, Fall 2009.
- ECE 531, Detection and Estimation Theory, Spring 2009.

Chicago, IL, US

January 2009 - present

Harvard University*Lecturer/Post-doctoral Fellow*

- Applied Math 21a, Mathematical Methods in the Sciences, Fall 2007
- Applied Math 21b Mathematical Methods in the Sciences, Spring 2008

Cambridge, MA, US

September 2007 - June 2008

Harvard University*Teaching Assistant*

Responsible for assigning and grading homework, creating and supervising student projects, holding office hours, website maintenance, weekly tutorial sections, and the occasional lecture. Student evaluations available upon request.

Cambridge, MA, US

September 2004 - June 2006

- ES 102 Introduction to Operations Research, Spring 2006.
Students rated overall 4.8/5.0.
- AM 106 Applied Algebra and Combinatorics, Fall 2005.
Nominated for best TF award. Students rated overall 4.8/5.0.
- ES 156 Signals and Systems, Spring 2005.
Recipient of Certificate of Distinction in Teaching. Students rated overall 4.86/5.0.
- AM 106 Applied Abstract Algebra and Combinatorics, Fall 2004.

OTHER
WORK
EXPERIENCE**Dudley House, Harvard University***Social Fellow*

Competitive paid position to organize 100-600 people dances/parties for the graduate student body of Harvard University.

Supervisor: Susan Zawalich, *zawalich@fas.harvard.edu*

Cambridge, MA, US

September 2005 - June 2007

Institute of Systems & Information**Technologies***Research Assistant*

Fukuoka, Japan

March 2002 - July 2002

HONORS AND
AWARDS

- FCAR Doctoral Scholarship, Harvard University (*18% acceptance*) September 2004-June 2007
- FCAR Master's Scholarship, Harvard University (*32% acceptance*) 2002-2004
- NSERC Scholarship, Harvard University, *declined* 2002
- James Mills Pierce Scholarship, Harvard University 2002 - June 2007
- NSERC Undergraduate Research Award, McGill University Summer 2001

I. Krikidis, **N. Devroye**, and J. Thompson, "Stability Analysis for Cognitive Radio with Multi-Access Primary Transmission," to appear in *IEEE Trans. Wireless Comm.*, accepted November 2009.

T. Koike-Akino, **N. Devroye**, and V. Tarokh, "Frequency-Domain Bit-Flipping Equalizer for Wideband MIMO Channels," *IEEE Trans. Wireless Comm.*, vol.8, no.10, pp.4969–4973, October 2009.

M. Vu, **N. Devroye**, and V. Tarokh, "On the Primary Exclusive Region of Cognitive Networks," *IEEE Trans. Wireless Comm.*, vol.8, no.7, pp.3380–3385, July 2009.

N. Devroye, N. B. Mehta, and A. F. Molisch, "Asymmetric Cooperation Among Wireless Relays with Linear Precoding," *IEEE Trans. Wireless Comm.*, vol.7, no.12, pp.5420–5430, December 2008.

N. Devroye, M. Vu and V. Tarokh, "Cognitive Radio Networks," *IEEE Signal Processing Magazine*, vol. 25, no. 6, pp. 12-23, November 2008 (*invited*).

M. Vu, **N. Devroye** and V. Tarokh, "An Overview of Scaling Laws in Ad Hoc and Cognitive Radio Networks," *Springer Journal, Special Issue on Cognitive Radio Technologies*, online March 2008, ISSN 0929-6212 (print) 1572-834X (online) (*invited*).

N. Devroye, M. Vu and V. Tarokh, "Scaling Laws and Achievable Rates for Cognitive Radio Models," *EURASIP Journal on Wireless Communications and Networking, special issue on Cognitive Radio and Dynamic Spectrum Sharing Systems*, February 2008 (*invited*).

N. Devroye, P. Mitran, O.-S. Shin, H. Ochiai, V. Tarokh, "Cooperation and Cognition in Wireless Networks," *SK Telecom Review, special issue on 4G Spectrum and System Engineering issues*, February 2007 (*invited*).

N. Devroye, P. Mitran, V. Tarokh, "Limits on communications in a Cognitive Radio Channel," *IEEE Comm. Magazine, Radio Communications Supplement*, June 2006.

N. Devroye, P. Mitran, V. Tarokh, "Achievable Rates in Cognitive Radio Channels," *IEEE Trans. Info. Theory*, vol. 52, no. 5, May 2006.

P. Mitran, **N. Devroye**, V. Tarokh, "On Compound Channels with Side-Information at the Transmitter," *IEEE Trans. Info. Theory*, vol. 52, no. 4, April 2006.

- S. Rini, D. Tuninetti, and **N. Devroye**, “State of the cognitive interference channel: a new unified inner bound, and capacity to within 1.87 bits,” to appear in the *2010 International Zurich Seminar on Communications*, Zurich, March 2010.
- S. Rini, D. Tuninetti, and **N. Devroye**, “The Capacity Region of Gaussian Cognitive Radio Channels to within 1.87 bits,” to appear in *Information Theory Workshop*, Cairo, January 2010.
- S. Rini, D. Tuninetti and **N. Devroye**, “The Capacity Region of the Gaussian Cognitive Radio Channels at High SNR,” *Information Theory Workshop*, Taormina, October 2009.
- S.-W. Jeon, **N. Devroye**, M. Vu, S.-Y. Chung and V. Tarokh, “Cognitive Networks Achieve Throughput Scaling of a Homogeneous Network,” *WiOPT (co-located with ISIT)*, June 2009.
- S.J. Kim, N. Devroye and V. Tarokh, “A class of Bi-directional multi-relay protocols,” *International Symposium on Information Theory*, June 2009.
- W.-Y. Shin, S.-W. Jeon, **N. Devroye**, M. Vu, S.-Y. Chung, Y. Lee and V. Tarokh, “Improved Capacity Scaling in Wireless Networks With Infrastructure,” *International Symposium on Information Theory*, July 2008.
- S.J. Kim, **N. Devroye**, P. Mitran and V. Tarokh, “Achievable rate regions for bi-directional relaying,” *IEEE Sarnoff Symposium*, April 2008.
- M. Vu, **N. Devroye**, M. Sharif, and V. Tarokh, “The primary exclusive region in cognitive networks,” *IEEE Consumer Comm. and Networking Conf. (CCNC)*, January 2008 (*invited*).
- N. Devroye**, N. B. Mehta, and A. F. Molisch, “Asymmetric Cooperation Among Relays with Linear Precoding,” *IEEE Globecom*, November 2007.
- M. Vu, **N. Devroye** and V. Tarokh, “Scaling laws of Cognitive Networks,” *Second International Conference on Cognitive Radio Oriented Wireless Networks and Communications (CROWNCOM)*, August 2007 (*invited*).
- N. Devroye** and M. Sharif, “The Multiplexing Gain of MIMO X-channels with Partial Transmit Side Information,” *International Symposium on Information Theory (ISIT)*, June 2007.
- N. Devroye**, P. Mitran, V. Tarokh, “Cognitive Decomposition of Wireless Networks,” *First International Conference on Cognitive Radio Oriented Wireless Networks and Communications (CROWNCOM)*, June 2006 (*invited*).
- N. Devroye**, P. Mitran, V. Tarokh, “Achievable Rates in Cognitive Networks,” *International Symposium on Information Theory (ISIT)*, September 2005.
- N. Devroye**, P. Mitran, V. Tarokh, “Achievable Rates in Cognitive Radio Channels,” *39th Annual Conf. on Information Sciences and Systems (CISS)*, March 2005.
- R. Yim, **N. Devroye**, V. Tarokh, H.T. Kung, “Achieving fairness in two-dimensional generalized processor sharing,” *22nd Biennial Symposium on Commun.*, April 2004.

BOOK CHAPTERS

N. Devroye, “Information Theoretical Limits on Cognitive Radio Networks,” to appear in *Cognitive Radio Communications and Networks; Principles and Practice*, A.M. Wyglinski, M. Nekovee and Y.T. Hou Ed, Springer 2009.

E. Hossain, L. Le, **N. Devroye** and M. Vu, “Cognitive Radio: From Theory to Practical Network Engineering,” to appear in *Advances in Wireless Communications*, V. Tarokh, I.F. Blake, A. Gulliver Ed.

N. Devroye and V. Tarokh, “Fundamental Limits of Cognitive Radio Networks,” *Cognitive Wireless Networks: Concepts, Methodologies and Vision*, F.H.P. Fitzek and M. Katz Ed., Springer, 2007.

N. Devroye, P. Mitran, M.Sharif, S. Ghassemzadeh, and V. Tarokh, “Information Theoretic Analysis of Cognitive Radio Systems,” *Cognitive Wireless Communications*, V. Bhargava and E. Hossain Ed., Springer, 2007.

O.-S. Shin, **N. Devroye**, P. Mitran, H. Ochiai, S. S. Ghassemzadeh, H. T. Kung, and V. Tarokh, “Cooperation, Competition and Cognition in Wireless Networks: From Theory to Implementation,” *Cooperation in Wireless Networks: Principles and Applications*, F. H. P. Fitzek and M. Katz Ed., Springer, 2006.

UNDER
SUBMISSION

W.-Y. Shin, S.-W. Jeon, **N. Devroye**, M. Vu, S.-Y. Chung, Y. Lee and V. Tarokh, “Improved Capacity Scaling in Wireless Networks With Infrastructure,” submitted to *IEEE Trans. Info. Theory*, November 2008.

S.J. Kim, **N. Devroye**, and V. Tarokh, “Bi-directional half-duplex protocols with multiple relays,” submitted to *IEEE Trans. Info. Theory.*, October 2008.

S.J. Kim, **N. Devroye**, P. Mitran and V. Tarokh, “Achievable rate regions for bi-directional relaying,” submitted to *IEEE Trans. Info. Theory.*, August 2008.

S.-W. Jeon, **N. Devroye**, M. Vu, S.-Y. Chung and V. Tarokh, “Cognitive networks achieve throughput scaling of a homogeneous network,” submitted to *IEEE Trans. Inform. Theory*, February 2008.

PATENTS

Work on cooperative communications at **Mitsubishi Electric Research Labs** led to the patent application “Asymmetric Cooperation in Downlink Cellular Networks with Relay stations”.

SERVICE

TPC member for the Selected Areas in Communications Systems (SAS) and Communication Theory Symposium (CTS) tracks of the 2010 International Conference on Communications (ICC) (<http://www.ieee-icc.org/2010/>)

TPC member for Globecom Communications Theory Symposium, 2009, 2010 (<http://www.ieee-globecom.org/>)

TPC member for PIMRC 2008, Cognitive Radio Workshop (<http://www.pimrc2008.org/>)

TPC member for Crowncom 2008 (<http://www.crowncom2008.org/>)

TPC member for ICCCN '08 (<http://icccn.org/icccn08/>)

TPC member for VTC 2008, Wireless Networking and Cognitive Radio track (<http://www.ieeevtc.org/vtc2008fall/>)

Reviewer for the journals *IEEE Transactions on Information Theory*, *IEEE Transactions on Wireless Communications*, *IEEE Transactions on Communications*, *IEEE Communication Letters*, *IEEE Journal of Selected Areas of Communications*, *IEEE Transactions on Signal Processing*, *EURASIP Journal on Wireless Communications and Networking*, *SK Telecom Review*.