

IOANA DUMITRIU
CURRICULUM VITAE

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Personal Data

Date of birth: July 06, 1976
Citizenship: Romanian

Fields of research

Numerical Analysis, Random Matrix Theory, Algorithmic and Probabilistic Game Theory.

Education

June 2003 Massachusetts Institute of Technology
Ph. D. in Applied Mathematics
Thesis title: "Eigenvalue Statistics for Beta-ensembles"
Thesis advisor: Professor Alan Edelman
May 1999 College of Arts and Science, New York University
Bachelor of Arts in Mathematics, minor in Computer Science, *Summa Cum Laudae*

Employment

10/2008 - present Adjunct Assistant Professor, Department of Applied Mathematics,
University of Washington, Seattle
09/2006 - present Assistant Professor, Department of Mathematics,
University of Washington, Seattle
09/2003 - 08/2006 Miller Research Fellow
Miller Institute for Research in Basic Sciences and
Department of Mathematics, U.C. Berkeley

Fellowships

Summer 2002 Clay Mathematics Institute Special Project Fellowship
2001-2002 IBM Ph. D. Fellowship
2000-2001 The MIT Provosts' Women/Minority Graduate Fellowship
1999-2000 Ida Green Fellowship, Massachusetts Institute of Technology
1995-1999 Samuel F. B. Morse Scholarship, New York University

Awards

2009 CAREER Award DMS 0847661, '09-'14
2008 The 2008-2009 Faculty Fellowship, Department of Mathematics, UW
2007 The 13th **Leslie Fox** Prize in Numerical Analysis
2005 **Householder Prize** for Best Dissertation in Numerical Algebra between 2002-2004,
Honorable Mention

Awards (cont'd)

- 1999 The Perley Lenwood Thorne Prize, College of Arts and Sciences, NYU
- 1999, 1998 The Mathematics Prize, Senior and Junior class, College of Arts and Sciences, NYU
- 1998 The Morris Klein Award, College of Arts and Sciences, NYU
- 1997 The Hollis Cooley Prize, Courant Institute of Mathematical Sciences
- 1996 **Alice T. Schafer Prize**, Association for Women in Mathematics
- 1996 **The Putnam Fellowship**
- 1996 **The William Lowell Putnam Prize Scholarship**
- 1995, 96, 97 The Elisabeth Lowell Putnam Prize

Publications and preprints

- (1) "Tridiagonal realization of the anti-symmetric Gaussian β -ensemble", with Peter Forrester, submitted to *Probability Theory and Related Fields* (2009).
- (2) "Accurate and efficient expression evaluation and linear algebra", with James Demmel, Olga Holtz, and Plamen Koev, *Acta Numerica*, **17** (2008), pp.87-145
- (3) "Distributions of the Extreme Eigenvalues of Beta–Jacobi Random Matrices", with Plamen Koev (2007), *SIAM J. Matrix Anal. Appl.*, **30** (2008), pp. 1-6.
- (4) "Fast linear algebra is stable", with James Demmel and Olga Holtz (2007), *Numer. Math.*, **108**(1), (2007), pp. 59-91.
- (5) "Fast matrix multiplication is stable", with James Demmel, Olga Holtz, and Robert Kleinberg, *Numer. Math.*, **106**(2), (2007), pp. 199-224.
- (6) "MOPs: A Maple Package for Computing Multivariate Orthogonal Polynomials", with Alan Edelman and Gene Shuman, *Journal of Symbolic Computation*, **42**(6), (2007), pp. 587-620.
- (7) "Global spectrum fluctuations for the β -Hermite and β -Laguerre ensembles via matrix models", with Alan Edelman, *Journal of Mathematical Physics*, **47**, 063302 (2006) (36 pages).
- (8) "Toward accurate polynomial evaluation in rounded arithmetic", with James Demmel and Olga Holtz, *Foundations of Computational Mathematics: Santander 2005* (L. Pardo et al, eds.), **Cambridge University Press** (2006), pp. 36-105.
- (9) "Toward accurate polynomial evaluation in rounded arithmetic (short version)", with James Demmel, Olga Holtz, and Robert Kleinberg, *Proceedings of the Dagstuhl Seminar "Algebraic and numerical algorithms and computer-assisted proofs"*, (B.Buchberger et al, eds.) (2006)
- (10) "The Two-Batch Liar Game over an Arbitrary Channel", with Joel Spencer, *SIAM Journal on Discrete Mathematics*, **19** (4)(2006), 1056-1064.
- (11) "The Liargame over an Arbitrary Channel", with Joel Spencer, *Combinatorica* **25** (2005), pp. 537-559.
- (12) "Eigenvalues of Hermite and Laguerre ensembles: large beta asymptotics", with Alan Edelman, *Annales de L'Institut Henri Poincaré (B)*, **41** (6) (2005), pp. 1083-1099.
- (13) "A Halfliar's Game", with Joel Spencer, *Theoretical Computer Science, Special Issue on Algorithmic Combinatorial Game Theory*, **313**(3) (2004), pp. 353-369.
- (14) "Branching Processes with Negative Offspring Distribution", with Joel Spencer and Catherine Yan, *Annals of Combinatorics*, **7** (1) (2003), R-43.
- (15) "Path Counting and Random Matrix Theory", with Etienne Rassart, *Electronic Journal of Combinatorics*, **10**(1) (2003), 35-47.
- (16) "On Playing Golf with Two Balls", with Prasad Tetali and Peter Winkler, *SIAM Journal on Discrete Mathematics*, **16**(4) (2003), pp. 604–615.

Publications and preprints (cont'd)

- (17) "Matrix Models for all Beta-Ensembles", with Alan Edelman, *Journal of Mathematical Physics*, **43** (11) (2002), pp. 5830-5847.
- (18) "On Generalized Tribonacci Sequences and Additive Partitions", *Discrete Mathematics*, **219** (2000), pp. 65–83.

Conference Presentations and Invited Talks

- April 2009 Mathematical Physics and Probability Seminar, UC Davis
Talk: "Anti-symmetric tridiagonal β ensembles"
- April 2009 Women in Math Lecture Series, MIT
Talk: "Linear computations: faster, bigger, better. Random?!"
- January 2009 Probability Seminar, UW
Talk: "In search of the elusive beta: from full to tridiagonal random matrices"
- November 2008 Combinatorial Potlatch 2008
University of Puget Sound
Talk: "Path Counting and the Moment Method for Random Matrices"
- August 2008 Workshop on Random Matrices, Related Topics, and Applications
CRM, Universite de Montreal
Talk: "Fast and stable eigenvalue computations? Use random matrices!"
- June 2008 FOCM 2008, Hong Kong
Talk: "Beta-ensembles: matrices and approximations"
- June 2008 The Householder Symposium, Zeuthen, Germany
Talk: "Fast Linear Algebra is stable"
- April 2008 MIT Women in Math conference, MIT
Talk: "Matrix computations: how fast and accurate can they be?"
- March 2008 MathDay 2008, University of Washington
Talk: "On Playing golf with Two Balls"
- November 2007 Probability Seminar, UW
Talk: "Playing golf with many balls: Markov chains and Gittins indices"
- October 2007 PNWNAS 2008, University of Washington
Talk: "Toward Accurate Polynomial Evaluation"
- August 2007 SIMUW, UW
Talk: "Playing golf with two balls, or how to make optimal decisions in random situations"
- July 2007 ICIAM 2007, Zurich
Talk: "Random matrices and applications: a brief survey"
- June 2007 Oxford University
Talk: "Toward accurate polynomial evaluation in rounded arithmetic"
- April 2007 University of Oregon, Corvallis
Colloquium talk: "Classical ensembles of random matrices:
from the threefold way to a β future"
- April 2007 Talk: "Tridiagonal matrix models for general β ensembles"
- April 2007 AMS Sectional Meeting, U of Arizona, Tucson
Invited Talk: "Beta ensembles: from old results (semicircle laws)
to new (stochastic operators)"
- March 2007 Applied Math Colloquium, University of Washington
Talk: "Fast Matrix Multiplication is Stable"
- March 2007 MathDay 2007, U of Washington
Talk: "How to catch a liar: from games to coding theory"

Conference Presentations and Invited Talks (cont'd)

- February 2007 CombinaTexas:Combinatorics in the South-Central U.S., Texas A.&M.
Plenary Talk: "Error-correcting codes with feedback, or
How to beat a (constrained) liar"
- November 2006 Combinatorics Seminar, U of Washington
Talk: "The Moment Method for Random Matrices"
- September 2006 SAMSI Program on High Dimensional Inference and Random Matrices
Opening Workshop
Talk: "Beta ensembles: a brief survey"
- July 2006 Stochastic Eigenanalysis (SEA) 2006, MIT
Talk: "Global fluctuations for the β -Hermite and β -Laguerre ensembles"
- June 2006 SIAM Conference on Discrete Mathematics, Victoria, CA
Talk: "Liar games with a fixed number of constrained lies"
- May 2006 Abel Symposium 2006, Alesund, Norway
Talk: "Toward accurate polynomial evaluation" and
"Recent developments in fast matrix multiplication"
- May 2006 Integrable Systems, Random Matrices, and Applications: Conference
in honor of Percy Deift's 60th birthday, NYU
Talk: "Concentration results for the β -Hermite and β -Laguerre ensembles"
- February 2006 Special Applied Mathematics Seminar, Caltech
Talk: "Classical Ensembles of Random Matrices: Gaussian, Wishart,
MANOVA, from the threefold way to a continuous β future"
- February 2006 Applied Mathematics Colloquium, MIT
Talk: "Classical Ensembles of Random Matrices: Gaussian, Wishart,
MANOVA, from the threefold way to a continuous β future"
- February 2006 Applied Mathematics Seminar, U.C. Berkeley
Talk: "Classical Ensembles of Random Matrices: Gaussian, Wishart,
MANOVA, from the threefold way to a continuous β future"
- February 2006 Probability / Statistics Seminar, Brown University
Talk: "Classical Ensembles of Random Matrices: Gaussian, Wishart,
MANOVA, from the threefold way to a continuous β future"
- February 2006 Computer Science Colloquium, Cornell University
Talk: "Toward accurate polynomial evaluation
rounded arithmetic"
- January 2006 Special Mathematics Colloquium, U.C. Irvine
Talk: "Classical Ensembles of Random Matrices: Gaussian, Wishart,
MANOVA, from the threefold way to a continuous β future"
- January 2006 Applied Math Seminar, University of Washington
Talk: "The Gaussian (Hermite), Wishart (Laguerre), and
Jacobi (MANOVA) ensembles of random matrix theory"
- December 2005 Applied Mathematics Seminar, University of Minnesota
Talk: "The Gaussian (Hermite), Wishart (Laguerre), and
Jacobi (MANOVA) ensembles of random matrix theory"
- July 2005 Foundations of Computational Mathematics '05, Santander, Spain
Invited Talk: "A β future for the classical ensembles of random matrices"
- May 2005 Householder XVI Symposium, Seven Springs, Pennsylvania;
Invited Talk: "Tridiagonal matrices: from linear algebra structures to
random matrix tools"

Conference Presentations and Invited Talks (cont'd)

- April 2005 "Erdős Magic for Algorithms and Games" Meeting, Bertinoro, Italy;
Talk: "Liar Games over an Arbitrary Channel"
- March 2005 Applied Math Colloquium, MIT;
Talk: "Towards Accurate Polynomial Evaluation"
- January 2005 Matrix Computations and Scientific Computing Seminar, U.C. Berkeley;
Talk: "Tridiagonal matrices: a new perspective on the old
 β -ensembles of Random Matrix Theory"
- November 2004 Applied Mathematics Colloquium, U.C. Berkeley;
Talk: "Tridiagonal random matrices: a new perspective on the old
 β -ensembles of Random Matrix Theory"
- November 2004 Joint Special Analysis Seminar / Probability and Mathematical Physics Seminar,
Courant Institute (NYU);
Talk: "Tridiagonal random matrices: a new perspective on the old
 β -ensembles of Random Matrix Theory"
- November 2004 Probability Seminar, U.C. Berkeley;
Talk: "On playing golf with two balls: a new presentation of an old result"
- October 2004 Analysis Seminar, Stanford U.;
Talk: "Tridiagonal random matrices: a new perspective on the old
 β -ensembles of Random Matrix Theory"
- August 2004 Mini-course on Random Matrix Theory, MATHFEST 2004, Providence;
Invited talk: "MOPS: Multivariate Orthogonal Polynomials (symbolically)"
- July 2004 6th World Congress of the Bernoulli Society, Barcelona;
Invited talk: "MOPS: A Maple Library for computing Multivariate Orthogonal
Polynomials (symbolically)"
- February 2004 Probability Seminar, U.C. Berkeley;
Talk: "Central Limit Theorems at β large for the β -Hermite and β -Laguerre
ensembles of Random Matrix Theory"
- February 2004 Scientific Computing/Computational Mathematics Seminar, Stanford U.;
Talk: "Stochastic Linear Algebra, Tridiagonal Random Matrices, and
Asymptotical Analysis of Eigenvalues"
- January 2004 Joint Applied Mathematics and Probability Seminar, Stanford U.;
Talk: "Global spectrum fluctuations for the β -Hermite and β -Laguerre ensembles"
- December 2003 Analysis and Mathematical Physics Seminar, UC Davis;
Talk: "Central Limit Theorems for the β -Hermite and β -Laguerre ensembles
of arbitrary β "
- November 2003 Random Matrix Theory and Statistical Mechanics Seminar, UC Davis;
Talk: "Numerical Linear Algebra Methods in Random Matrix Theory"
- October 2003 Mathematical Physics Seminar, Caltech;
Talk: "Global spectrum fluctuations of large beta-Hermite (Gaussian)
and beta-Laguerre ensembles".
- October 2003 Matrix Computations and Scientific Computing Seminar, U.C. Berkeley;
Talks: "Introduction to Random Matrices"
"Linear Algebra and Random Matrices"
- February 2003 Mathematics Department Colloquium, U.C. Berkeley;
Talk: "Numerical Linear Algebra Methods in Random Matrix Theory".
- Oct 2002 Combinatorics Seminar, Massachusetts Institute of Technology;
Talk: "Jack Polynomials and Multivariate Orthogonal Polynomials:
theory, applications, and computations".

Conference Presentations and Invited Talks (cont'd)

- Aug 2002 Foundations of Computational Mathematics, FoCM'02, Institute for Mathematics and its Applications; Talk: "MOPs: a Maple Package for Computing Multivariate Orthogonal Polynomials (symbolically)".
- June 2002 Householder XV Symposium, Peebles, Scotland; Talk: "Applying Numerical Algorithms Stochastically."
- June 2002 Random Matrix Theory and Combinatorics Conference, Courant Institute of Mathematical Sciences; Talk: "Matrix Models for β Ensembles and Applications".
- Feb 2002 Seminar on Algorithmic Combinatorial Game Theory IFBI Schloss Dagstuhl, Germany; Talk: "A Halfliar's Game".
- Nov 2001 Numerical Analysis Seminar, Courant Institute for Mathematical Sciences; Talk: "Random Tridiagonal Matrices as Models for All β -Ensembles".
- Aug 2001 Workshop on spectral statistics and high-energy eigenstates, Le Centre de Recherches Mathématiques, Montreal; Talk: "Beyond the 3-fold way: Random Matrix Models for all beta-ensembles".
- Aug 2001 Random Matrix Day, Massachusetts Institute of Technology; Talk: "Beyond the 3-fold Way".

Teaching Experience

- 2006-present Math 480 (The Art of Problem Solving)
Math 124, 125 (Calculus I and II), Math 462 (Combinatorial Theory II)
Math 583 (Combinatorial Methods in Random Matrix Theory)
- Fall 2003 Co-taught (with W. Kahan) an undergraduate Honors Problem Seminar (in preparation for the Putnam Math Contest) at UC Berkeley
- Fall 2001 Taught a recitation session for 18.03 (Ordinary Differential Equations) at MIT;
- Fall 2000 Taught a recitation session for 18.06 (Linear Algebra) at MIT;
- 1996-1999 Departmental Tutor for Calculus I, II, and III, Linear Algebra, and Discrete Mathematics at Courant Institute.

Conference/Workshop/Lecture Series Organizer

- 2008-present *MathAcrossCampus*, a public lecture series at UW
Co-organizer with Rekha Thomas and Chris Hoffman
- October 2007 *Pacific Northwest Numerical Analysis Seminar*, Seattle
Co-organizer (with R. LeVeque)
- July 2007 *ICIAM 2007*, Zurich, Switzerland
Co-organized minisymposium on Random Matrix theory (with A. Edelman)
- June 2006 *SIAM Discrete Math 2006*, Victoria, Canada
Co-organized minisymposium on Liar Games and Coding Theory (with J. Spencer)
- June-July 2005 *FOCM 2005*, Santander, Spain
Co-organized workshop on Random Matrices (with A. Edelman and R. Rao)

Other Experiences

- Fall 2004 Co-organized (with N. Reshetikhin) a Student Seminar on Random Matrices and Asymptotical Combinatorics;
- 05/2001-11/2002 Supervised and worked with an undergraduate student on a Maple package for Multivariate Orthogonal Polynomials (MOPs)
- Summers '99, '00 Bell Labs, Lucent Technologies
Summer Research Intern in the Fundamental Mathematics Department
- 1997 Participated in the Research Experience for Undergraduates Program at University of Minnesota, Duluth

Memberships

Phi Beta Kappa, SIAM, AMS, MAA, AWM

Other academic and academically-related functions

Executive Board member for PBK, chapter Alpha of Washington.
Reviewer for *FOCM*, *LAA*, *SIMAX*, *Probability Theory and Related Fields*, *Integers: EJCNT*, *American Journal of Mathematics*, *Advances in Applied Mathematics*, *Theoretical Computer Science*, *Discrete Applied Mathematics*, *J. Combinatorial Theory A*.

References

Prof. James Demmel, U.C. Berkeley, demmel@cs.berkeley.edu
Prof. Alan Edelman, MIT, edelman@math.mit.edu
Prof. Joel Spencer, Courant Institute, spencer@cs.nyu.edu
Prof. Craig Tracy, U.C. Davis, tracy@math.ucdavis.edu
Prof. Alexander Soshnikov, U.C. Davis, soshniko@math.ucdavis.edu
Prof. Alexei Borodin, Caltech, borodin@its.caltech.edu