

Raissa M. D'Souza

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- Education*
- ◇ **Massachusetts Institute of Technology**, Cambridge, MA.
Ph.D. in Statistical Physics: 1999.
Thesis: *Macroscopic order from reversible and stochastic lattice growth models*.
 - ◇ **University of Illinois**, Champaign-Urbana, IL. B.S. in Physics with Distinction: 1991.

- Academic Awards*
- Santa Fe Institute, Fellow-at-Large, 2001-2002.
 - Vazquez Thesis Award, MIT Department of Physics, 1999.
 - MIT Department of Physics Fellowship Recipient, 1991-1994.
 - National Science Foundation Scholar: StatPhys20, Paris, France, 1998.
 - Santa Fe Institute Complex Systems Summer School participant, 1996.
 - Japan Association for Mathematical Sciences Fellow, 1993, 1996.
 - AT&T Bell Laboratories Undergraduate Scholarship Award.
 - Viola Herr Scholarship Award.

Research Areas Statistical physics, Mathematics and applications of networks, Computational science, Probability theory, Applied math, Cellular automata, and Networking protocols.

- Professional Experience*
- ◇ **University of California**, Davis, CA. Fall 2005-present
Assistant Professor, Center for Computational Science and Engineering, and Department of Mechanical and Aeronautical Engineering.
 - ◇ **Mathematical Sciences Research Institute**, Berkeley, CA. Spring 2005
Core member of semester on “Probability, Algorithms and Statistical Physics”.
 - ◇ **Microsoft Research**, Redmond, WA. 2002-2004
Postdoctoral member of the Theory Group.
 - ◇ **Institute for Pure and Applied Mathematics**, UCLA, May-June 2002
Core participant in program, “Large Scale Communication Networks”.
 - ◇ **Bell Laboratories**, Murray Hill, NJ Jan 2000 - Apr 2002
Postdoctoral member of the technical staff, Fundamental Mathematics and the Theoretical Physics Research departments.
 - ◇ **MIT Department of Physics, and Lab for Computer Science**, 1993 - 1999
Researcher in the Condensed Matter Theory and in the Information Mechanics Groups.
 - ◇ **Visiting Scientist**
 - California Inst of Technology, June 2004 and April 2003.
 - École Normale Supérieur, Lyon, France, July 2003.
 - University of California, Berkeley, Dept of Statistics, June 2002.

- Patents Granted:* [P1] R. M. D'Souza, S. Ramanathan, and D. Temple Lang, "Adaptive power level setting in an ad-hoc wireless network". US Patent, 6,970,714. Granted Nov. 2005.
- Refereed Publications:*
- ◇ **Network growth models and applications:**
 1. R. M. D'Souza, C. Borgs, J. T. Chayes, N. Berger, R. D. Kleinberg, "Emergence of Tempered Preferential Attachment From Optimization", *Proc. Natn. Acad. Sci., USA*, to appear 2007.
 2. R. M. D'Souza, D. Galvin, C. Moore, and D. Randall, "Global connectivity from local geometric constraints for sensor networks with various wireless footprints", in *Proceedings of The Fifth International Conference on Information Processing in Sensor Networks (IPSN 2006)*. (Paper acceptance rate: 15%)
 3. N. Berger, C. Borgs, J. T. Chayes, R. M. D'Souza, and R. D. Kleinberg. "Degree Distribution of Competition-Induced Preferential Attachment Graphs", *Combinatorics, Probability and Computing* **14** (5-6), 697-721, 2005.
 4. N. Berger, C. Borgs, J. T. Chayes, R. M. D'Souza, and R. D. Kleinberg. "Competition-Induced Preferential Attachment", *Lecture Notes in Computer Science (ICALP 2004)* **3142** 208-221, 2004.
 5. R. M. D'Souza, S. Ramanathan, and D. Temple Lang. "Measuring performance of ad hoc networks using timescales for information flow", in *Proceedings of IEEE, INFOCOM 2003*. (Acceptance rate: 21%)
 - ◇ **Phase transitions, statistical physics and computational physics**
 6. R. M. D'Souza, D. Achlioptas, and J. Spencer, "Controlling phase transitions in random graphs", *Under review*, 2006.
 7. R. M. D'Souza, "BML revisited: Statistical Physics, Computer Simulation and Probability". *Complexity*, **12** (2) 30–39, 2006.
 8. R. M. D'Souza, "Coexisting phases and lattice dependence of a cellular automata model for traffic flow", *Physical Review E* **71**, 2005.
 9. R. M. D'Souza, N. H. Margolus, and M. A. Smith. "Dimension-splitting for simplifying lattice-gas models of diffusion", *Journal of Statistical Physics*, **107** (1), 2002.
 10. R. M. D'Souza, Y. Bar-Yam, and M. Kardar. "Sensitivity of Ballistic Deposition to Pseudorandom Number Generators", *Physical Review E* **57** (5), 1998.
 11. R. M. D'Souza. "Anomalies in Simulations of Nearest Neighbor Ballistic Deposition", *Int. Jour. of Modern Physics C* **8** 941, 1997.
 - ◇ **Thermodynamics and Computation**
 12. R. M. D'Souza, G. E. Homsy, and N. H. Margolus. "Simulating digital logic with the Reversible Aggregation model of cluster growth", in *New Constructions in Cellular Automata*, Oxford University Press, 2003.
 13. R. M. D'Souza and N. H. Margolus. "Thermodynamically reversible generalization of Diffusion Limited Aggregation", *Physical Review E* **60** (1), 1999.
 14. R. M. D'Souza. "Macroscopic order from reversible and stochastic lattice growth models", PhD Thesis, MIT, 1999.
 - ◇ **Miscellaneous**
 15. J. Silvis, D. Niemeier, and R. M. D'Souza. "Social Networks and Travel Behavior: Report from an integrated travel diary", in *Proceedings of the 11th International Conference on Travel Behaviour Research*, Kyoto, Japan, 2006.
 16. A. A. MacDowell, et al., "Soft-X-Ray Projection Imaging with a 1/1 Ring-Field Optic", *Applied Optics* **32** (34), 1993.
 17. W. M. Mansfield, et al., "Effects of Absorption on Resist Performance in Soft X-Ray Projection Lithography", *OSA Proc. on Soft X-Ray Projection Lithography* **12**, 1991.

- Grants Funded:* · “Longitudinal effects of Design in Open Source Projects” P. Devanbu, R. D’Souza, V. Flikov, G. Hsu and A. Swaminathan. NSF Science of Design Program. \$750,000, 9/06 - 8/09.
- Ⓔ Under Review:* · “Dynamic networks, Computation and Self-organization”, David and Lucille Packard Foundation, Fellowships for Science and Engineering, Submitted 4/2006.
- Organizer:* · European Conference on Complex Systems 2006, Technical Program Committee Member, Oxford University, September 2006.
· Institute for Complex Systems Research of Valparaiso (ISCV). Organizing, joint with the Santa Fe Institute, the Inaugural Residency Month, Valparaiso, Chile, December 2006.
- Referee for:* Journal of Statistical Physics, Physical Review, IEEE Infocom 2003 and 2004, IEEE Transactions on Networking, IEEE Communications Letters, Journal of Multivariate Logic, IEEE Foundations of Computer Science (FOCS) 2006, Cottrell College Science Awards 2006.
- Advisory Boards:* · Microsoft Working Group on Strategy and Innovation for the 21st Century. Headed by J. Pincus, General Manager for Strategy Development, Microsoft Corporation.
- Teaching* · UC Davis, CSE 298, “Understanding Networks, Theory and Applications”. Spring 2006. New, interdisciplinary, graduate class developed. All lectures and materials available at: <http://mae.ucdavis.edu/dsouza/Classes/MAE298-Spr06/mae298.html>
· UC Davis, Engineering 102, “Dynamics”. Fall 2007, Winter 2006.
· MIT, Dept of Physics, Teaching Assistant, “Statistical Mechanics” Graduate Course. 1997.
· MIT, Dept of Physics, Teaching Assistant, “Biological Physics” Graduate Course. 1995.
· MIT, “Advanced Physics”, Summer Engineering Program, Summer 1994 and 1995.
- Students currently supervised:* · Julia Silvis, PhD Candidate UC Davis, Graduate Group in Transportation Technology & Policy (TTP).
· Haoran Wen, PhD Candidate UC Davis, Mechanical Engineering.
· Dissertation Committee member for UC Davis PhD candidates: Christian Bird (Comp. Sci.), Zeqian Shen (Comp. Sci.), Adrian Bell (Ecology), and Adam Henry (TTP).
- Invited Talks* ◇ **Colloquia**
· “Statistical Physics, computer simulation and probability”, University of Michigan, Center for the Study of Complex Systems Colloquium, Jan 19, 2006.
· “The networked world”, Land, Air and Water Resources, UC Davis, October 27, 2005.
· “Self organization, phase transitions, and dynamic networks”, University of Washington, Physics Colloquium, June 2, 2003.
· “Thermodynamics, pattern formation, and networks”, California Institute of Technology, Physics Colloquium, April 24, 2003.
◇ **Plenary Lectures**
· “Kinetic phase transitions, and caveats from simulation”, Plenary lecture, 5th Understanding Complex Systems Symposium, University of Illinois, Urbana, IL, May 16-19, 2005.
◇ **Invited Seminars**
2007
· Institute for Pure and Applied Mathematics, “Random Curves, Surfaces, and Transport” Workshop. April 16-20, 2007.
· Institute for Pure and Applied Mathematics, “Random and Dynamic Graphs and Networks” Workshop. May 7 - 11, 2007.

2006

- UC Davis, Statistics Seminar, Nov 16, 2006.
- American Institute of Mathematics (AIM) workshop on Phase Transitions in Physics, Computer Science, Combinatorics and Probability Theory, Palo Alto CA, Aug 21-25, 2006.
- Principle lecturer, Santa Fe Institute, Complex Systems Summer School, Institute for Theoretical Physics, Beijing, China, July 2006.
- Principle Lecturer, Mathematical Association of America, PREP workshop “Mathematics of Markov Chain Monte Carlo”, MSRI, Berkeley CA, June 12-16, 2006.
- “Statistical physics meets probability theory”, American Mathematical Society Meeting, San Francisco CA, April 29, 2006.
- “Principles of Self-organization for sensor networks”, Fifth International Conference on Information Processing in Sensor Networks, Nashville TN, April 20, 2006.
- “Probability, Algorithms and Statistical Physics”, Bay Area Discrete Math Symposium, Google Research Labs, Mountain View CA, April 15, 2006.

2005

- “Optimization, network growth and power laws”, Santa Fe Institute, July 2005.
- “Competition-Induced Preferential Attachment”, MSRI workshop on Models of Real-World Random Networks. Berkeley, CA, April 2005.
- “Networks and self-organization”, Santa Fe Institute, Business Partners Meeting. San Jose, CA, March 2005.
- “Networks, Power Laws and Phase Transitions”, University of Michigan, Ann Arbor, MI, March 2005.
- “The non-phase transition in the BML traffic model”, MSRI workshop on Phase Transitions in Computation and Reconstruction. Berkeley, CA, March 2005.

2004

- “Cellular Automata models of computation”, Computing Beyond Silicon Summer School, California Institute of Technology. June 2004.
- “Networks and optimization” Google Research Labs, May 2004.
- “Networks and power laws” CSE, Univ. of CA, Davis, May 2004.
- “Self-organized networks” Dept of Computer Science, Univ. of Southern CA, April 2004.
- “Networks and computation” Dept of Comp. Sci., Univ. of CA, San Diego, April 2004.
- “Networks, power laws and phase transitions” School on Informatics, Indiana University, March 2004.
- “Phase transitions and lattice models” Physics Department, City College of New York, March 2004.
- “Competition-induced Preferential Attachment” Applied Math Seminar, Dartmouth College, Hanover NH, Feb. 2004.
- “Competition-induced Preferential Attachment” Applied Math Seminar, Univ. of Washington, Feb. 2004.

2003

- “Self-organization of geometric graphs”, Emergence and Engineering in Complex Systems, University of Michigan-Santa Fe Institute Workshop, Ann Arbor, MI. Nov 2003.
- “Heat baths, cluster growth and thermodynamics”, Physical Chemistry Seminar, University of Washington, Seattle WA. Oct 2003.
- “Is there an optimal network topology for sensor nets?”, IPAM Large Scale Communications Networks conference, UCLA Conference Center, Lake Arrowhead, CA. Sep 2003.

2003, cont.

- “Dynamic network topology”, International Conference on Discrete Models for Complex Systems, École Normale Supérieure de Lyon. June 2003.
- “Measuring performance of ad hoc networks using timescales for information flow” IEEE INFOCOM 2003, San Francisco, CA. April 2003.

2002

- “Phase transitions in percolation, amplification, noisy computation and sampling”, UC Berkeley workshop on Theory of Computation & the Sciences, May 2002.
- “Discrete dynamical systems”, Combinatorics Seminar, UC Berkeley, April 2002.

2001

- “Physical dynamics as computation”, Santa Fe Institute, Aug 2001.
- “Thermodynamics with discrete dynamical systems”, Invited lecture, 85th Stat Mech Meeting, Rutgers University, May 2001.

Additional Invited Talks: Cornell University, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, Exxon Research, Northeastern University, Bell Laboratories, Microsoft Research.

Additional Activities & Service

- Invited participant, “**Kavli Frontiers of Science**”, sponsored by the National Academy of Sciences, Irvine, CA, December 8-10, 2006.
- Invited participant, “**Tech Leaders**”, Anita Borg Institute, Nov. 2005.
- Coordinator of Women in MAE dinners, UC Davis, 2005-present.
- Member of the review committee at the Center for Information Technology Research in the Interest of Society (CITRIS), UC Berkeley, 2003.
- Speaker on math education policy reformed at the “Just for the kids”, K-12 Mathematics Education Summit, Austin TX, 2000.
- Panelist on the Computing Research Association discussion, Researching your way to a career, available at <http://www.cs.uiuc.edu/education/grad/forum.html>, Urbana IL, 2000.
- Coordinator of the Women in Physics Dinners for the MIT Physics Department, 1993-1999.
- Chair, Japan Association for Mathematical Sciences, Summit on the Environment, Crested Butte, CO, 1997.
- President of the MIT/Harvard Coalition for the Supercollider: Organized an Institute Forum on the Future of Science; Published “The Cartoon Guide to the SSC”.
- Counselor, Initiatives camp for inner-city Washington D.C. children.
- Member: AAAS, American Physical Society, Division of Computational Physics of APS, Statistical and Nonlinear Physics Division of APS.
- Female, of Chilean and Indian descent. Bicultural upbringing in USA and Chile. Citizenship: USA and Chile.
- Foreign Language skills: Fluent in Spanish, proficient in French.
- Hobbies: rock climbing, sailing, scuba diving, backcountry camping. Extensive travel throughout North and South America, Europe, India, Nepal, Malaysia, Japan, Borneo, New Zealand.