

Maria-Rita Rosaria D'Orsogna
California State University at Northridge, CA 91130
dorsogna@csun.edu (818) 677 2703

Current position:

Associate Professor, Mathematics Department CSUN 2007 - present

Visting Professor, Biomathematics Department UCLA 2012 - present

Research interests:

Statistical mechanics, mathematical modeling, computer simulations of biological and complex dynamical systems

Education:

Ph.D. Physics, University of California at Los Angeles, 2003

Thesis: Charge transfer in DNA: the role of thermal fluctuations and of symmetry

M.A. Physics, University of Maryland at College Park, 1998

Reports: Unified treatment of step-edge fluctuations: limiting cases and crossover behavior
Growth on Cu100 using improved simulation algorithm

Baccalaureate, Physics, University of Padova, Italy, 1996

Thesis: Directed paths in random media, discontinuous depinning from rough substrates
Summa cum laude

Professional experience:

Research associate, Mathematics Department, UCLA, 2004-2007

Swarming many-body systems in biology and robotics. Experimental implementations in the robotics laboratory. Ligand-receptor binding in biological systems

Research associate, Chemistry Department, Caltech, Pasadena, CA 2003-2004

Lattice models and Monte-Carlo simulations of water molecules and biological membranes

Analyst, IBM Milan, Italy 1998-1999

Professional service and associations:

Referee for the National Science Foundation, the National Academy of Sciences, the Netherlands Organisation for Scientific Research, the Physical Review, SIAM, IEEE Conference Proceedings, Springer Verlag publishing, Physica A and D, the European Physical Journal, the Journal of Statistical Physics, the Journal of Non-Linear Science, Physics Letters A, the International Journal of Control, Differential Equations and Dynamical Systems

Member of the American Physical Society, the Society for Industrial and Applied Mathematics, the Biophysical Society

Contributions to Gradstein and Ryzhik, 'Table of Integrals, Series and Products', 7th ed. Found novel integral series. Listed at <http://mathworld.wolfram.com/Erf.html>

Publications - in press and submitted:

38. *Stochastic coagulation and fragmentation: incommensurability and first passage times*, Q. Lei, M. R. D'Orsogna and T. Chou, submitted (2014)
37. *Hydrocarbon contamination in sediments of the Pertusillo freshwater reservoir, Val d'Agri, Southern Italy*, A. Colella and M. R. D'Orsogna, submitted (2014)
36. *Crime, punishment and evolution in an adversarial game*, M. McBride, R. Kendall, M. B. Short and M. R. D'Orsogna, submitted (2014)
35. *Statistical physics of crime: A review*, M. R. D'Orsogna and M. Perc, submitted (2014)
34. *First passage problems in biology*, T. Chou and M. R. D'Orsogna, in "First-passage phenomena and their application", 306-345 edited by R. Metzler, G. Oshanin, S. Redner, World Scientific, Singapore (2014)
33. *Recidivism and rehabilitation of criminal offenders: A carrot and stick evolutionary game* B. Berenji, T. Chou and M. R. D'Orsogna, PLoS One **9** e85531 (2014)
32. *Combinatoric and mean-field analysis of heterogeneous self-assembly* B. Zhao, B. Berenji, T. Chou and M. R. D'Orsogna, *J. Chem. Phys.* **139** 121918 (2013)
31. *Criminal defectors lead to the emergence of cooperation in an experimental, adversarial game* M. R. D'Orsogna, M. McBride, R. Kendall and M. Short, PLoS One **8** e61458 (2013)
30. *External conversions of player strategy in an evolutionary game: A cost benefit analysis through optimal control* M. Short, A. Pitcher and M. R. D'Orsogna, *Euro. J. Appl. Math.* **24** 131 (2013)
29. *Territorial developments based on graffiti: a statistical mechanics approach* A. Barbaro, L. Chayes and M. R. D'Orsogna, *Physica A* **392** 252 (2013)
28. *First passage times in homogeneous nucleation and self-assembly* R. Yvinec, M. R. D'Orsogna and T. Chou, *J. Chem. Phys.* **137** 244107 (2012)
27. *Desert locust dynamics: behavior phase change and swarming* C. Topaz, M. R. D'Orsogna, L. E. Keshet and A. Bernoff, *PLoS Comp. Biol.* **8** e1002642 (2012)
26. *Stochastic self-assembly of incommensurate clusters* M. R. D'Orsogna, G. Lakatos and T. Chou, *J. Phys. Chem.* **136** 084110 (2012)
25. *Coarsening and accelerated equilibration in mass-conserving heterogeneous nucleation* T. Chou and M. R. D'Orsogna, *Phys. Rev. E* **84** 011608 (2011)
24. *Cooperation and punishment in an adversarial game: How defectors pave the way to peaceful society* M. B. Short, J. Brantingham, M. R. D'Orsogna, *Phys. Rev. E* **82** 066603 (2010)
23. *Diffusion-dependent mechanisms of receptor engagement and viral entry* M. Gibbons, T. Chou, M. R. D'Orsogna, *J. Phys. Chem. B* **114** 15403-15412 (2010)
22. *Arrival times in a zero-range process with injection and decay*

- B. Shargel, M. R. D’Orsogna and T. Chou, *J. Phys. A.* **43** 305003 (2010)
21. *Optimal transport and apparent drug resistance in viral infections*
M. R. D’Orsogna, T. Chou, *PLoS One* **4** e8165 (2009)
20. *Enhancement of cargo processivity by cooperating molecular motors*
F. Posta, M. R. D’Orsogna, T. Chou, *Phys. Chem. Chem. Phys.* **11**, 4851 (2009)
19. *Double milling in self-propelled swarms from kinetic theory*
J. Carrillo, M. R. D’Orsogna, V. Panferov, *Kin. Rel. Mod.* **2** 363 (2009)
18. *Measuring and modeling repeat and near-repeat burglary effects*
M. Short, M. R. D’Orsogna, G. Tita, J. Brantingham, *J. Quant. Criminol.* 10.1007 (2009)
17. *A statistical model of criminal behavior*
M. Short, M. R. D’Orsogna, V. Pasour, G. Tita, P. Brantingham, A. Bertozzi, L. Chayes, *Math. Mod. Meth. Appl. Sci.* **18** 1249 (2008)
16. *Multi-stage adsorption of diffusing macromolecules and viruses*
T. Chou, M. R. D’Orsogna, *J. Chem. Phys.* **127** 105101 (2007)
15. *State transitions and the continuum limit for interacting, self-propelled particles*
Y. Chuang, M. R. D’Orsogna, D. Marthaler, A. Bertozzi, L. Chayes, *Phys. D* **232** 33 (2007)
14. *Exact steady states for translocation ratchets driven by random sequential adsorption*
M. R. D’Orsogna, T. Chou, T. Antal, *J. Phys. A* **40** 5575 (2007)
13. *Multi-Vehicle flocking: Scalability of Cooperative Control Algorithms using Pairwise Potentials*
Y. Chuang, Y. Huang, M. R. D’Orsogna, A. Bertozzi, *Proceedings from the IEEE International Conference on Robotics and Automation*, 2292 (2007)
12. *Self-propelled particles with soft-core interactions: patterns, stability and collapse.*
M. R. D’Orsogna, Y. Chuang, A. Bertozzi, L. Chayes, *Phys. Rev. Lett.* **96** 104302 (2006)
11. *Pattern formation, stability and collapse in 2D driven particle systems.*
M. R. D’Orsogna, Y. Chuang, A. Bertozzi, L. Chayes in ‘Device applications of non linear dynamics’, page 103, edited by A. Bulsara and S. Baglio (Springer-Verlag , Berlin Heidelberg, 2006)
10. *First Passage and Cooperativity of Queuing Kinetics*
M. R. D’Orsogna, T. Chou, *Phys. Rev. Lett.* **95** 170603 (2005)
9. *Interparticle gap distributions on one-dimensional lattices*
M. R. D’Orsogna, T. Chou, *J. Phys. A* **38** 531 (2005)
8. *Chiral molecule adsorption on helical polymers*
M. R. D’Orsogna, T. Chou, *Phys. Rev. E* **69** 021805 (2004)
7. *Interplay of chemotaxis and chemokinesis mechanisms in bacterial dynamics*
M. R. D’Orsogna, M. A. Suchard, T. Chou, *Phys. Rev. E* **68** 021925 (2003)
6. *Charge transfer, symmetry, and dissipation in donor-acceptor molecules*
M. R. D’Orsogna, R. Bruinsma, *Phys. Rev. Lett.* **90** 078301 (2003)

5. *Two-level system with a thermally fluctuating transfer matrix element: Application to the problem of DNA charge transfer*
M. R. D’Orsogna, J. Rudnick, Phys. Rev. E **66** 041804 (2002)
4. *Fluctuation-facilitated charge migration along DNA*
R. Bruinsma, G. Grüner, M. R. D’Orsogna, J. Rudnick, Phys. Rev. Lett. **85** 4393 (2000)
3. *Edge diffusion during growth: The kink Ehrlich-Schwoebel effect and resulting instabilities*
O. Pierre-Louis, M. R. D’Orsogna, T. Einstein, Phys. Rev. Lett. **82** 3661 (1999)
2. *Wetting of rough walls*
A. Stella, G. Sartoni, G. Giugliarelli, M. R. D’Orsogna, Int. J. Thermophys. **19** 1209 (1998)
1. *Effect of surface roughness on bulk-disorder-induced wetting*
G. Sartoni, A. Stella, G. Giugliarelli, M. R. D’Orsogna, Europhys. Lett. **39** 633 (1997)

Seminars and colloquia:

Georgia Institute of Technology, Mathematics Department, October 2014
 University of Maribor, Slovenia, Physics Department, April 2014
 Case Western University, Cleveland, Mathematics Department, April 2014
 Université Pierre et Marie Curie, Paris, France, Mathematics Department, March 2014
 University of North Carolina at Chapel Hill, Raleigh, Mathematics Department, February 2014
 University of Colorado, Boulder, Mathematics Department, October 2013
 University of Cagliari, Biochemistry Department, June 2013
 University of Vienna, Austria, Mathematics Department, June 2012
 University of Graz, Austria, Mathematics Department, June 2012
 California Nanoscience Initiative, University of California at Santa Barbara, February 2012
 University of California at Los Angeles, Biomathematics Department, February 2012
 University of California at Riverside, Mechanical Engineering Department, November 2011
 University of California at Santa Barbara, Mathematics Department, February 2011
 University of Pescara, Italy, Economics Department, December 2010
 University of Padova, Italy, Physics Department, June 2009
 Centre de Recerca Matemàtica, Barcelona, Spain, Mathematics Department, June 2009
 University of California at Los Angeles, Mechanical Engineering Department, May 2008
 University of California at Riverside, Physics Department, February 2008
 University of California at Los Angeles, Biomathematics Department, November 2007
 University of British Columbia, Mathematics Department, October 2007
 University of Alberta, Mathematics Department, October 2007
 California State University at Northridge, Mathematics Department, May 2007
 Purdue University, Physics Department, March 2007
 Virginia Tech, Engineering and Applied Math Department, March 2007

University of South Florida, Physics Department, March 2007
University of California at Merced, Math Department, February 2007
University of Virginia, Physics Department, February 2007 - colloquium
University of Michigan at Ann Arbor, Physics Department, January 2007 - colloquium
Claremont Graduate University, Mathematics Department, December 2006 - colloquium
Carnegie Mellon University, Physics Department, November 2006 - colloquium
George Mason University, Physics Department, May 2006
University of Rome La Sapienza, Physics Department, March 2006
University of California at Los Angeles, Math Department, May 2005
University of California at Los Angeles, Chemistry Department, April 2005
University of Amsterdam, Physics Department, March 2005
Caltech, Chemistry Department, February 2003
University of California at San Diego, Physics Department, February 2003
University of Padova, Physics Department, June 2002
University of Maryland, Physics Department, September 1998

Conferences and Programs:

SIAM conference on dynamical systems, Snowbird UT, May 2014 - invited talk
Institute for Mathematics and its Applications St. Paul, Minnesota April 2015
National Academies Keck Futures Initiatives on Collective Behavior Irvine, CA November 2014
Kavli Institute for Theoretical Science Santa Barbara, CA July-August 2014
7th International Conference on Biomathematics and Ecology: Education and Research, Claremont, CA October 2014 - invited talk
10th AIMS conference on Dynamical Systems, Differential Equations and Applications, Madrid, Spain July 2014 - invited talk
AMS Sectional Meeting
Albuquerque, NM April 2014 - invited talk
IPAM Materials for a sustainable future,
Los Angeles, CA, September-December 2013
SIAM annual meeting
San Diego, CA July 2013 - invited talk
Indo-American Frontiers of Science Symposium
Agra, India April 2013 - invited talk
IMPA Mathematical models and modeling of biophysical phenomena
Rio de Janeiro, Brazil March 2013 - invited talk
CEAMOS Third Workshop on Analysis and Modelling of Security
WAMOS 2013, Santiago, Chile January 2013 - invited talk
PIMS Workshop on Computational Criminology

Vancouver, BC September 2012 - invited talk
 MoCCsy 5th Annual Symposium,
 Vancouver, BC September 2012 - invited talk
 9th AIMS conference on Dynamical Systems, Differential Equations and Applications,
 Orlando, FL July 2012 - 2 invited talks
 SIAM Conference on Nonlinear Waves and Coherent Structures,
 Seattle, WA June 2012 - invited talk
 Spring Symposium on Game Theory for Security, Sustainability and Health, Stanford,
 Palo Alto, CA March 2012
 10th International Conference on Operations Research, L'Havana, Cuba, March
 2012 - invited talk
 Emergent behaviour in multi-particle systems with non-local interactions, Banff Interna
 tional Research Station, Banff, Canada, January 2012 - invited talk
 Mathematical Theory and Simulation of Phase Transitions, Beijing, China,
 November 2011
 The USC Physical Sciences in Oncology Center First Annual Short Course, Los Angeles,
 CA October 2011
 Mathematical Biosciences Institute Workshop on New Questions in Probability Theory
 Arising in Biological Systems, Columbus, OH September 2011
 International Congress on Industrial and Applied Mathematics, Vancouver, Canada, July
 2011 - invited talk
 Foundations of Computational Mathematics, Budapest, Hungary, July 2011 - invited talk
 IMPA Mathematical Methods and Modeling of Biophysical Phenomena, Foz do Iguacu,
 Parana, Brazil, March 2011 - invited talk
 Mathematical Biosciences Institute Workshop on Insect Self-organization and Swarming,
 Columbus, OH March 2011
 Southern California Systems Biology Conference,
 University of California at Irvine, CA January 2011
 Arthur M. Sackler Colloquia of the National Academy of Sciences - In the Light of Evolution
 V: Cooperation, Irvine, CA January 2011
 AMS Sectional Meeting - Los Angeles, CA October 2010 - invited talk
 8th International Conference of Numerical Analysis and Applied Mathematics, Rhodes,
 Greece, September 2010 - invited talk
 CAIMS - Dynamical systems, St.John's, Canada, July 2010 - invited talk
 SIAM Emerging topics in dynamical systems and partial differential equations Barcelona,
 Spain, May 2010 - invited talk
 AMS Pattern formation in biological systems, St. Paul, MN April 2010 - invited talk
 Winter school and 9th ICOR on PDEs and Mathematical Biology, L'Havana, Cuba, Febru-
 ary 2010 - invited talk
 SIAM Analysis of partial differential equations Miami, FL December 2009 - invited talk

Kinetic and mean-field models in the socio-economic sciences, Edinburgh, Scotland, July 2009 - invited talk

Deterministic and stochastic modeling in computational neuroscience and other biological topics, Barcelona, Spain, May 2009 - invited talk

Statistical Mechanics workshop in honor of Attilio Stella's 60th birthday, Venice, Italy, April 2009 - invited talk

Mathematical models in life and social sciences, L'Aquila, Italy, July 2008 - invited talk

Centro oli - per una valutazione degli impatti, Pescara, Italy, July 2008 - invited talk

AIMS seventh international conference on dynamical systems, differential equations and applications, Arlington, TX May 2008 - invited talk

IPAM Optimal Transport, Los Angeles, CA, March-June 2008

Mathematical Systems Biology Symposium, Irvine, CA, February 2008

Biophysical society meeting, Long Beach, CA, February 2008

Dynamics Days, Knoxville, TN, January 2008 - invited talk

SIAM conference on dynamical systems, Snowbird UT, May 2007 - invited talk

International Conference on Robot Automation ICRA 2007, Rome, Italy, April 2007

IPAM Random Shapes, Los Angeles, CA, March-June 2007

Expanders and self-assembly, Hewlett Packard Palo Alto, CA, November 2006 - invited talk

Swarming by nature and by design, Los Angeles, CA, February 2006 - invited talk

Nonlinear control, Pasadena, CA, November 2005 - invited talk

Multi-scale analysis and computation, Los Angeles, CA, November 2005 - invited talk

Device applications of non-linear systems, Catania, Italy, October 2005 - invited talk

SIAM Dynamical systems, Snowbird, UT, May 2005 - invited talk

IPAM Cells and Materials, Los Angeles, CA, March-June 2006

Understanding complex systems, Urbana-Champaign, IL, May 2006

Dynamics days, Bethesda, MD, January 2006

Conference on statistics, mathematics and related fields, Honolulu, HI, January 2006

Gordon research conference on non-linear systems, Waterville, ME, July 2005

Biophysical society meeting, Long Beach, CA, February 2005

StatPhys 22, Bangalore, India, July 2004

Gordon research conference on colloids, Ventura, CA, February 2002

DNA charge transfer workshop, Los Angeles, CA, September 2001

Physics electronics conference, State College, PA, June 1998

American physical society, Various locations, 1998-present

Teaching experience:

Lecturer, Math Department CSUN, 2007-present

Sust 300: Interdisciplinary perspectives on sustainability

Math 140: Introductory statistics

Math 150A: Calculus I Math 150B: Calculus II

Math 250: Calculus III Math 351: Differential equations

Math 592C: Mathematical biology, graduate class

Lecturer, Summer Institute CSUN, 2007

PUMP lecturer

Lecturer, Math Department UCLA, 2004-2007

Biomath 201: Deterministic models in biology, graduate class

Math 142: Math modeling, upper division Math 31B: Calculus

Math 151a Applied Numerical Methods I, upper division

Teaching Assistant, Physics Department UCLA Winter 2000 - Spring 2003

Analytic Mechanics, Quantum Mechanics, Introductory Physics classes

Awards:

Jerome Ritchfield Fellow, Selected as CSUN's best researcher campus-wide, April 2014

Earch research career award, Selected as the best junior researcher within the College of Science and Mathematics, May 2013

Grants awarded:

Army Research Office, 2014-2017, PI

Warfighter neuroendocrinology: modeling stress response, PTSD, and TBI - awarded

Multi-disciplinary University Research Initiative (MURI - ARO) - 2011-2014, CoPI

Scalable, stochastic and spatiotemporal game theory for real world human adversarial behavior - awarded

National Science Foundation DMS-1021850 2010-2014, PI

Hierarchical kinetic models for chemically and hydrodynamically coupled organisms - awarded

National Science Foundation DMS-0719462 2007-2011, PI

Stochastic models of viral adsorption, fusion and replication - awarded

National Science Foundation DUE-0969627 2010-2013, Senior Personnel

Students Targeting Engineering and Physical Science - awarded