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

Current position:

Assistant Professor, Mathematics Department CSUN 2007 - 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 sum 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

Awards and special accomplishments:

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

Fellowship, A. Gini Foundation, 3 year award for young researchers, 2000-2002

Fellowship, Fermi National Laboratory, Undergraduate research award 1996-1997

Professional service and associations:

Referee for the National Science Foundation, 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

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

Publications - in press and submitted:

26. *Ergodicity-mediated coarsening in ligand-receptor binding*
T. Chou and M. R. D'Orsogna, submitted (2010)

25. *Territorial development based on graffiti: a statistical mechanics approach*
A. Barbaro, L. Chayes and M. R. D'Orsogna, submitted (2010)

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/s10940-009-9068-8 (2009)

17. *A statistical model of criminal behavior*
M. Short, M. R. D'Orsogna , V. Pasour, G. Tita, P. Brantigham, A. Bertozzi, L. Chayes,
Math. Mod. Meth. Appl. Sci. **18** 1249 (2008)

16. *Multistage 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 Heidel-

berg, 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:

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 Matematica, 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:

Foundations of Computational Mathematics, Budapest, Hungary, July 2011 - invited talk

International Congress on Industrial and Applied Mathematics, Vancouver, Canada, 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 9^{th} ICOR on PDEs and Mathematical Biology, L'Havana, Cuba, February 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 60^{th} 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

Official student mentoring:

Independent studies and research - William Sherman, Kimberly Short and Alex Krausner
Master thesis advisor - Thesis: Local triad dynamics and social balance, 2009
by Mr. Ashar Ali, currently a doctoral student at the University of Colorado, Boulder
Honors student mentor - Corinne Ingalla, Paulita Hernandez, 2009-2010
Angelica Morfin 2010-2011
Research in industrial projects for students - RIPS, IPAM Summer 2008, 2005
Preparing undergraduates for PhD-s through mentoring - PUMP, CSUN Summer 2007
Research experience for undergraduates - REU, UCLA Summer 2006
Independent studies mentor, UCLA Spring 2006

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

Grants awarded:

National Science Foundation DMS-0719462 2007-2011, PI - \$118 K
Stochastic models of viral adsorption, fusion and replication - awarded

National Science Foundation DMS-1021850 2010-2013, PI - \$106 K
Hierarchical kinetic models for chemically and hydrodynamically coupled organisms - awarded

Institute for Pure and Applied Math, Optimal transport core participation 2008 - awarded

National Science Foundation DUE-0969627 2010-2013, Senior Personnel
Students Targeting Engineering and Physical Science - awarded

Other grants - pending, in preparation or declined:

Multidisciplinary University Research Initiative (MURI - ARO) - CoPI, \$685 K (per CoPI), pending, 2010

Pro-active Recruitment in Introductory Science and Mathematics (PRISM - NSF) - CoPI, declined, 2010

Mc Donnell Foundation - PI, \$300,000 declined, 2010

Sloan Research Fellowship - PI, \$50,000 declined, 2009

Center for Research Excellence in Science and Technology (NSF) - CoPI, declined, 2008

Research Focus Group (RFG - NSF) - CoPI, declined, 2008

Center for Research at the Interface of the Mathematical and Biological Sciences (CIMBS - NSF) - CoPI, declined, 2008

Early Research Career Award - declined, 2007