

Razvan Teodorescu

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EDUCATION:

Ph. D. in Mathematical Physics, University of Chicago, 2004

APPOINTMENTS

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|-------------|---|
| 2009 – | Assistant Professor, Mathematics Dept. at Univ. of South Florida, Tampa |
| 2006 – 2009 | Director's Postdoctoral Fellow, Los Alamos National Laboratory |
| 2004 – 2006 | Research Officer, Physics Department, Columbia University, New York |
| 1999 – 2004 | Graduate Research Assistant, J. Franck Institute, University of Chicago |

AWARDS/FELLOWSHIPS

- American Physical Society Award
The International Brazil-U.S. Professorship/Lectureship Program, 2011-2012
- Leading Young Researcher Award
Centre for Mathematical Research, University of Montreal,
Thematic Year "Probabilistic Methods in Theoretical Physics", 2008
- Laboratory Director's Postdoctoral Fellow Award
Los Alamos National Laboratory, 2006
- International undergraduate scholarship
(the only fellowship in Physics awarded nationwide)
École Polytechnique, Palaiseau (Paris), France, 1994 – 1996

PROFESSIONAL AFFILIATIONS

- Member of the *American Mathematical Society*, *American Physical Society*, *American Association for the Advancement of Science* and the *Society for Industrial and Applied Mathematics*

GRANTS

- American Physical Society travel grant, the International Brazil-U.S. Professorship/Lectureship Program, 2011-2012.

- National Science Foundation Division of Mathematical Sciences, proposal No. 1019602, 2010.
- U.S. Department of Energy LDRD project No. 20061449PRD2, Los Alamos National Laboratory, 2006 – 2008.
- University of South Florida conference grant, academic year 2009-2010.

SYNERGISTIC ACTIVITIES

August 2011	Lecturer, University of South Florida Mathematics Club <i>"The synchronization phase transition: mathematics and beyond"</i>
April 2010	Speaker, The Mathematics Honor Society, Florida Epsilon Chapter 2010 Pi Mu Epsilon Annual Induction Ceremony <i>"Complexity, Disorder and Life in General"</i>
September 2009	Lecturer, University of South Florida Mathematics Club <i>"Of Numbers, Computers, and Million-Dollar Prizes"</i>
Summer 2009	Mentor, Los Alamos National Laboratory Summer Students Program Graduate student: Charles Martin, Univ. of California at Santa Barbara <i>"Algorithmic complexity of stability analysis of hybrid systems"</i>
Summer 2008	Mentor, Los Alamos National Laboratory Summer Students Program Graduate student: Ferenc Balogh, Concordia University, Montreal <i>"Studying 2D pattern formation with orthogonal polynomials"</i>
June 2008	Lecturer, Los Alamos National Laboratory Summer School <i>"Interface growth in two dimensions: from mathematics to biology and computer science - a physicist's perspective"</i>
June 2007	Lecturer, Los Alamos National Laboratory Summer School <i>"Complexity in strongly correlated systems"</i>
Spring 2002	Ph.D. Qualifying Exam Instructor, Physics Department, Univ. of Chicago
Summer 2001	Mentor, Research Experience for Undergraduates (REU), U. of Chicago Assistant to prof. Robert Rosner, Dept. of Astronomy and Astrophysics

OUTREACH/SERVICE/PEDAGOGICAL

Spring 2011	Chair, Distinguished University Professor committee (Mathematical sciences) USF
Spring 2011	Department of Mathematics and Statistics undergraduate committee, USF
Spring 2011	Department of Mathematics and Statistics colloquium committee, USF
Fall 2010 –	Undergraduate research adviser: student Sean Hollis, USF
August 2010	Member, National Council for Undergraduate Research
August 2010	Adviser, Ph.D. dissertation committee: student Janaka Kosgolla, USF
February 2010	Adviser, Ph.D. dissertation committee: student Adrian Popescu, USF
October 2009	Chair, Ph.D. dissertation committee: student Kevin Tatur, USF
May 2007	International Grand Awards Judge, INTEL (former Westinghouse) Competition
Spring 2003	Student Member, Graduate Admission Committee, Physics Dept., U. of Chicago

CONFERENCES/EDITORIAL ACTIVITY

- Special session organizer, [International Federation of Nonlinear Analysts World Congress](#), Athens, Greece, June 2012.
- “Applications of complex analysis in mathematical physics and generalized optimization problems”, Organizer, [Southeastern AMS Sectional Meeting](#), Tampa, FL, March 2012.
- Co-organizer of the USF-UCF-UF-Southern Florida College [Florida Analysis Seminar](#), Lakeland, FL, January 2011, May 2011.
- Co-organizer of the [International Workshop on Complex Analysis and Mathematical Physics](#), Chillan, Chile, December 2010.
- Co-organizer of the [Workshop on Gravitational Lensing](#), University of South Florida, Tampa, FL, April 2010.
- Organizer of the [International Workshop on Classical and Quantum Information Theory](#), Center for Nonlinear Studies at Los Alamos National Laboratory, Santa Fe, NM, March 2008.
- Organizer of the [Los Alamos National Laboratory-UNM-ASU-AZU Conference](#), Albuquerque, NM, February 2008.
- Reviewer for:

Mathematical Reviews (2005 –),
Journal of Physics A (2006 –),
Journal of Physics B (2008 –),
Physics Letters A (2008 –),
Physical Review Letters (2009 –),
Physical Reviews B (2009 –),
Journal of Statistical Physics (2009 –),
Journal of Statistical Mechanics (2009 –),
Advances in Analysis and Mathematical Physics (2010 –).

SELECTED PRESENTATIONS

TALKS/WORKSHOPS/CONFERENCES

- Research program on [Complex analysis and integrable systems](#), *Institut Mittag-Leffler, Stockholm, Sweden*, Fall 2011 (*upcoming*)
- Workshop on [Modeling and Novel Computational Methods of Complex Analysis](#), *International Conference on Industrial and Applied Mathematics, Vancouver, Canada*, July 2011

- Workshop on [Applications of Dynamical Systems](#), *Conference of the Society for Industrial and Applied Mathematics, Snowbird, Utah*, May 2011
- Workshop on [Complex Analysis and Mathematical Physics](#), *American Mathematical Society - Chilean Mathematical Society Collaboration, Chillan, Chile*, December 2010
- Conference on [Integrable and stochastic Laplacian growth in modern mathematical physics](#), *Pacific Institute for Mathematical Sciences, Banff International Research Station*, November 2010
- The second Gulf Coast Conference on [Probability and Statistics](#), *University of South Florida*, February 2010
- Ohio Section of the American Physical Society Workshop on [Synchronization](#) (plenary speaker), *Ohio Wesleyan University*, October 2009
- Workshop on [Low-dimensional Quantum Field Theories and Applications](#), *Galileo Galilei Institute for Theoretical Physics, Florence, Italy*, September 2008
- Workshop on [Laplacian Growth and Related Topics](#), *Centre for Mathematical Research, Université de Montréal*, August 2008
- Workshop on [Random Matrices, Related Topics and Applications](#), *Centre for Mathematical Research, Université de Montréal*, August 2008
- Workshop on [Complexity, Disorder and Algorithms](#), *Aspen Center for Physics*, June 2008
- Conference on [Quadrature Domains and Laplacian Growth in Modern Physics](#), *Pacific Institute for Mathematical Sciences, Banff International Research Station*, July 2007
- Workshop on [Stochastic Geometry and Field Theory: From Growth Phenomena to Disordered Systems](#), *Kavli Institute for Theoretical Physics, Santa Barbara*, October 2006
- Conference on [Random Matrices, Random Processes and Integrable Systems](#), *Centre for Mathematical Research, Université de Montréal*, June 2005
- Workshop on [Applications of Random Matrices in Physics](#), *Les Houches Summer School, Les Houches, France*, June 2004

RECENT INVITED SEMINARS/ LECTURES

- Universidad Federal de Pernambuco a Recife Physics Colloquium, August 2011
"Of bubbles, growth, and singularities: how to tell when we are near a critical point"
- Universidad Federal de Pernambuco a Recife Physics Department, August 8-11, 2011
Lecture series on "Integrable hierarchies and stochastic Loewner evolution"
Series developed under the APS - Brazilian Physical Society lectureship/professorship program

- Washington University in Saint Louis Physics Colloquium, March 2011
“The complexity of critical phenomena - from mesoscopics to nonlinear optics”
- University of Central Florida Analysis Seminar, March 2011
“Shocks and Stokes in viscous flows”
- University of Indiana at Indianapolis Analysis Seminar, February 2011
“Shocks and Stokes in viscous flows”
- The first Florida Analysis Seminar at Southern Florida College, January 2011
“Integrability, from freak waves to quantum billiards”
- University of South Florida Statistics Department Colloquium, November 2010
“Universal limits of nonlinear measure redistribution processes and their applications”
- University of South Florida Physics Department Colloquium, February 2010
“Random-Matrix Theory in Physics: from Gauge Theories to Disordered Electronic Systems”
- University of South Florida Statistics Department Colloquium, September 2009
“Synchronization of Stochastically Coupled Oscillators: Dynamical Phase Transitions and Large Deviations Theory (or Birds and Frogs)”
- University of Louisiana Physics Department Colloquium, February 2009
“Pattern formation in two dimensions”
- University of South Florida Mathematics Department Colloquium, January 2009
“Applications of orthogonal polynomials to inverse problems in the complex plane”
- Quantum Lunch Seminar, Theoretical Division, LANL, April 2008
“Quantum information processing with cold Fermi gases in the fast pairing regime”
- Vanderbilt University, Analysis Seminar, April 2008
“Planar Harmonic Growth with Orthogonal Polynomials”
- Caltech, Analysis Seminar, March 2008
“Harmonic Growth in 2D via Biorthogonal Polynomials, a.k.a. Laplacian Growth”
- Louisiana State University, Analysis Seminar, March 2008
“Harmonic Growth in 2D via Biorthogonal Polynomials”
- Los Alamos National Laboratory, CNLS Seminar, January 2008
“Nonlinear quantum dynamics and information theory: cats and kets”
- Wayne State University, Mathematics Department Colloquium, November 2007
“Harmonic Growth in 2D via Biorthogonal Polynomials”
- University of New Mexico, Electromagnetism and Waves Seminar, September 2007
“Stochastic Loewner Equation and Critical Phenomena in 2D”

- Center for Nonlinear Studies Seminar, Los Alamos National Laboratory, June 2007
“Large deviations, weak convergence, and all that”

PUBLICATIONS

BOOKS

- 1) “Conformal and Potential Analysis in Hele-Shaw Cells” (second edition)
with Björn Gustafsson and Alexander Vasiliev,
Birkhäuser, Germany, in preparation.
- 2) “Applications of random matrix theory in strongly interacting electronic systems and stochastic growth processes”
VDM Publishing House, Germany, in preparation.
- 3) “Methods of applied mathematics: an interdisciplinary approach”
Available at <http://myweb.usf/~razvan/applied>.

BOOK CHAPTERS

- 3) “A linear path toward self-synchronization: Analysis of the fully locked transition of the Kuramoto model”
D. Roberts and R. Teodorescu, in INDS’08 workshop proceedings, Shaker Verlag, Germany, 2009.
- 4) “Coherent oscillations in cold Fermi atoms and their applications”
in *Leading-Edge Superconductivity Research Developments*, ISBN 978-1-60456-017-6, 2008.

JOURNAL ARTICLES

- 5) “Universal limits of nonlinear measure redistribution processes and their applications”
R. Teodorescu, in the J. of Problems of Nonlinear Analysis in Engineering Systems (2011).
- 6) “Viscous shocks in Hele-Shaw flow and Stokes phenomena of the Painlevé I transcendent”
S-Y. Lee, R. Teodorescu and P. Wiegmann, *Physica D* (2011), doi:10.1016/j.physd.2010.09.017.
- 7) “Weak solution of the Hele-Shaw problem: shocks and viscous fingering”
S-Y. Lee, R. Teodorescu and P. Wiegmann, *JETP Letters* 92, no. 2, (2010) 91.
- 8) “Lemniscates are destroyed by Laplacian growth”
D. Khavinson, M. Mineev-Weinstein, M. Putinar and R. Teodorescu, *Mathematical Research Letters* 17 2 (2010) 337.
- 9) “Non-equilibrium thermodynamics and topology of currents”
V. Chernyak, M. Chertkov, S. Malinin and R. Teodorescu, *J. of Stat. Phys.* 137 1 (2009) 109.

- 10) ["Shocks and finite-time singularities in Hele-Shaw flow"](#)
S-Y. Lee, R. Teodorescu and P. Wiegmann, *Physica D: Nonlinear Phenomena* 238 (2009), 1113.
- 11) ["Belief Propagation and Loop Series on Planar Graphs"](#)
M. Chertkov, V. Chernyak and R. Teodorescu, *J. Stat. Mech.* (2008) P05003.
- 12) ["Random matrix theory in 2D, Laplacian growth, and operator theory"](#)
M. Mineev-Weinstein, M. Putinar and R. Teodorescu, *J. Phys. A: Math. Theor.* 41 (2008) 263001
(invited review article).
- 13) ["A linear path toward synchronization: Anomalous scaling in a new class of exactly solvable Kuramoto models"](#)
D. Roberts and R. Teodorescu, issue on *Nonlinear Dynamics and Chaos* of the *Eur.Phys.J.*, (2008).
- 14) ["Relaxation of nonlinear oscillations in BCS superconductivity"](#)
R. Teodorescu, *J. of Phys. A: Math. Gen.* 39 (2006) 10363.
- 15) ["Generic critical points of normal matrix ensembles"](#)
R. Teodorescu, *J. of Phys. A: Math. Gen.* 39 (2006) 8921.
- 16) ["Unstable Fingering Patterns of Hele-Shaw Flows as a Dispersionless Limit of the Kortweg-de Vries Hierarchy"](#)
R. Teodorescu, A. Zabrodin and P. B. Wiegmann, *Phys. Rev. Lett.* 95 4 (2005) 044502.
- 17) ["Normal matrix ensemble as a growth problem"](#)
R. Teodorescu, E. Bettelheim, O. Agam, A. Zabrodin and P. B. Wiegmann, *Nucl. Phys. B* 704 (2005) 407.
- 18) ["Semiclassical evolution of the spectral curve in the normal random matrix ensemble as Whitham hierarchy"](#)
R. Teodorescu, E. Bettelheim, O. Agam, A. Zabrodin and P. B. Wiegmann, *Nucl. Phys. B* 700 (2004) 521.

PREPRINTS (ON ARXIV.ORG)

- 19) ["Optimal Approximation of Harmonic Growth Clusters by Orthogonal Polynomials"](#)
F. Balogh and R. Teodorescu, to be submitted to *Journal of Complex Analysis and Operator Theory*
- 20) ["Quantum information processing with cold Fermi gases in the fast pairing regime"](#)
to be submitted to *Phys. Rev. Lett.*

PROFESSIONAL REFERENCES

1. *Professor Carl Bender*, **Konneker Distinguished Professor of Physics**, **Washington University** CB 1105, St. Louis, MO 63130, Ph: (314) 935-6216, E-mail: cmb@howdy.wustl.edu
2. *Dr. Robert Ecke*, **Director**, Center for Nonlinear Studies, **Los Alamos National Laboratory** TA-3, M.S. B258, Los Alamos, NM 87545, Ph: (505) 667-6733, E-mail: ecke@lanl.gov
3. *Professor Gregory Falkovich*, **Head**, Physics Department, **Weizmann Institute of Science** Rm 249, Rehovot 76100, Israel, Ph: +(972) 8-934-2830, E-mail: Gregory.Falkovich@weizmann.ac.il
4. *Dr. Stuart Gazes*, **Director of Undergraduate Studies**, Physics Dept., **University of Chicago** 5720 South Ellis Ave., Chicago, IL 60637, Ph: (773) 702-7760, E-mail: s-gazes@uchicago.edu
5. *Professor John Harnad*, **Director**, Center for Mathematical Research, **University of Montreal** C.P. 6128, Montréal, Québec, Canada, Ph: (514) 343-2491, E-mail: harnad@crm.umontreal.ca
6. *Professor Igor Krichever*, **Chair**, Department of Mathematics, **Columbia University** 2990 Broadway, New York, NY 10027, Ph: (212)-854-3951, E-mail: krichev@math.columbia.edu
7. *Professor Mihai Putinar*, Department of Mathematics, **U. California at Santa Barbara** 6722 South Hall, Santa Barbara, CA 93106, Ph: (805) 893-3252, E-mail: mputinar@math.ucsb.edu
8. *Professor David Sherrington*, **Director**, Condensed Matter Theory Group, **Oxford University** Rudolf Peierls Ctr., Oxford, UK, Ph: + (44) 1865-273952, E-mail: d.sherrington1@physics.ox.ac.uk
9. *Professor Zoltan Toroczkai*, **Director**, Ctr. for Complex Network Research, **U. of Notre Dame** 225 Nieuwland Hall, Notre Dame, IN 46556, Ph: (574) 631-2618, E-mail: toro@nd.edu
10. *Professor Paul Wiegmann* **Director**, the James Franck Institute at **University of Chicago** 5640 South Ellis Ave. Chicago, IL 60637, Ph: (773) 702-4208, E-mail: wiegmann@uchicago.edu