Razvan Teodorescu

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Education

Ph. D. in Mathematical Physics, University of Chicago, 2004
M.Sci. in Theoretical Physics, West Virginia University, 1999
B. Sci. in Theoretical Physics, "Al. I. Cuza" University Iasi, Romania, 1996
Maitrise, Physics and Mathematics, École Polytechnique, Paris, France, 1995

Appointments

2013 –	Associate Professor, Mathematics Dept. at Univ. of South Florida, Tampa
2009 – 2013	Assistant Professor, Mathematics Dept. at Univ. of South Florida, Tampa
2009 –	Affiliate Member, T-4 group at Los Alamos National Laboratory
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

- US Army STEM Mentor Award
  Army Education Outreach Program, 2016
- 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
- Gregor Wentzel Prize for Excellence in Teaching nomination
  Physics Department, University of Chicago, 2000
- International Award for Eastern European students
  George Soros Foundation, 1997
- International undergraduate scholarship
  École Polytechnique, Palaiseau (Paris), France, 1994 – 1996
- International undergraduate scholarship (not pursued)
  Lomonosov University, Moscow, Russia, 1991

Synergistic Activities (past 10 years)

July 2017	USF STEM Education Center Summer School "STEM for Scholars" Course developed: MAT 4930 "From Ideas to Proofs"
Spring 2017	Leader, *Mathematical Foundations of General Relativity* study group USF College of Arts and Sciences
July 2016	USF STEM Education Center & US Army Academy of Science Mentor – High-school student mentored: Roshan Warman *"Cantilever tip dynamics in Atomic Force Microscopy"* (winner of the 2016 Ky Fan AMS award for high-school students)
July 2015	USF STEM Education Center & US Army Academy of Science Mentor Course developed: "Mathematics 360: from problem-solving to proof-writing" – High-school student mentored: Ricardo Condori, AEOP fellow *"Generating functions for 1-dimensional random walks"* – High-school student mentored: Roshan Warman *"Spintronics circuits: the building blocks of spin-based computation"* (Undergraduate Journal of Mathematical Modeling, vol. 7, no. 1, 2016)
October 2014	Speaker, University of South Florida Mathematics Club *"Analysis on large graphs vs. graphical models of analyticity"*
July 2014	USF STEM Education Center & Army Academy of Science Mentor Course developed: "The building blocks of STEM" – High-school student mentored: Pranav (Raj) Warman *"A study on the topological properties of large Erdös-Rényi graphs"* (First prize in Senior Mathematics, Florida State STEM Fair) – High-school student mentored: Logan White *"Modeling Rocket Flight in the Low-Friction Approximation"* (Undergraduate Journal of Mathematical Modeling, vol. 6, no. 1, 2014)
August 2011	Speaker, University of South Florida Mathematics Club *"The synchronization phase transition: mathematics and beyond"*
April 2010	Speaker, The Mathematics Honor Society, Florida Epsilon Chapter 2010 Pi Mu Epsilon Annual Induction Ceremony *"Complexity, Disorder, and Life in General"*
September 2009	Speaker, University of South Florida Mathematics Club *"Of Numbers, Computers, and Million-Dollar Prizes"*
Summer 2009	Mentor, Los Alamos National Laboratory Summer Students Program Graduate student: Charles Martin, Univ. of California at Santa Barbara *"Algorithmic complexity of stability analysis of hybrid systems"*
Summer 2008	Mentor, Los Alamos National Laboratory Summer Students Program Graduate student: Ferenc Balogh, Concordia University, Montreal *"Studying 2D pattern formation with orthogonal polynomials"*
June 2008	Lecturer, Los Alamos National Laboratory Summer School *"Interface growth in two dimensions: from mathematics to biology and computer science - a physicist's perspective"*
June 2007	Lecturer, Los Alamos National Laboratory Summer School *"Complexity in strongly correlated systems"*
May 2007	INTEL-ISEF (former Westinghouse) Competition Grand Awards Judge, Physics and Astronomy

Grants (**12**)

- University of South Florida conference grant, co-PI, 2016-2017.
- National Science Foundation, Division of Math. Sciences, proposal no. 1600479, co-PI, 2016-2017.
- University of South Florida Proposal Enhancement Grant, co-PI, 2015-2016.
- National Science Foundation, Division of Physics, proposal no. 1310360, co-PI, 2013-2014.
- National Science Foundation, Division of Math. Sciences, proposal no. 1301675, co-PI, 2013-2014.
- University of South Florida conference grant, co-PI, 2013-2014.
- National Science Foundation, Division of Math. Sciences, proposal no. 1301577, co-PI, 2013-2014.
- University of South Florida Proposal Enhancement Grant, co-PI, 2011-2012.
- American Physical Society travel grant, the International Brazil-U.S. Lectureship Program, PI, 2011.
- National Science Foundation, Division of Math. Sciences, award 1019602, co-PI, 2010-2011.
- University of South Florida conference grant, co-PI, 2009-2010.
- U.S. Dept. of Energy LDRD project 20061449PRD2, Los Alamos National Lab, 2006 – 2008.

Service/Pedagogical

Departmental Level (Mathematics)

2018 –	Joint Physics-Mathematics Programs Exploratory Committee (ad-hoc)
2018 – 2019	Postdoctoral Hiring Committee
2017 – 2018	Instructor Hiring Committee
2015 – 2018	Graduate Studies Committee
2016 – 2017	Calculus Teaching Task Force (ad-hoc)
2015 – 2016	Leader, Analysis Seminar
2014 – 2016	Advisory Committee
2014 – 2015	Mathematics Dept. and Florida Center for Cybersecurity (FC^2) Hiring Committee
2014 – 2016	Graduate Admissions Committee (acting director, Fall 2014)
2013 – 2014	Lecture Series Committee
2013 – 2014	Graduate Studies Committee
2011 – 2013	Undergraduate Studies Committee
2010 – 2011	Interdisciplinary Committee
2010 – 2011	Colloquium Committee

College Level

2016 – 2018	School of Natural Sciences and Mathematics Tenure and Promotion Committee
2016 – 2017	College of Arts and Sciences Tenure and Promotion Committee
2015 – 2016	STEER grant liaison for the USF-HCC FUSE project
2013 – 2015	College of Arts and Sciences Instructor Promotion Committee

University Level

2017 – 2020	General Education Council, Faculty Senate
2017 – 2018	Governance Committee, Faculty Senate (ad hoc)
2016 –	Faculty Research Council (grant reviewer)
2016 – 2019	Faculty Senate Member
2015 –	USF Office of National Scholarships (Marshall/Rhodes/Cambridge panelist)
2014 – 2017	Honors and Awards Council, Faculty Senate
2013 – 2014	Distinguished University Professor Discipline Committee (Chair for Mathematics)
2010 – 2011	Distinguished University Professor Discipline Committee (Chair for Mathematics)

Students Advised (at USF) (**32**)

- **Ph.D. Advisor (2):** Wael Al-Sawai (2014 –), Lisa Paris (2015 –)
- **Ph.D. Committee (15):** Maryam Bagherian (2016-), Matt Green (2015-), Ryan Thurman (2015-), Meng Yang (2014-), Xiang Gu (2014 –), Karl Payne (Civil Eng., 2014-), Morgan Mcanally (graduated 2017),Vijay Garapati (graduated 2017), Kristina Hilton (graduated 2017), Solomon Manukure (graduated 2016, went to USF-St. Petersburg as faculty), Matt Fleeman (graduated 2016, went to Baylor Univ. as postdoc), Otunuga Olusegun (graduated 2014, went to Marshall Univ., WV, as assistant professor), Lisa De Castro (graduated 2013, went to Southern Florida College as assistant professor), Janaka Kosgolla (Civil Engineering, graduated 2012, went to Marquette Univ. as postdoc), Adrian Popescu (Physics, graduated 2012, went to NIST as postdoc)
- **Ph.D. Chair (4):** Yousseff Fassi Fehri (Economics, November 2016), Nam Le (Physics, March 2016), Kevin McCash (Physics, June 2014), Kevin Tatur (Physics, October 2009)
- **M.S. Committee (2):** Josiah Park (graduated 2016), James Klinedist (graduated 2014)
- **Undergraduate Honors Thesis Director (7):** Nathan Hayford (Mathematics), Erinn Wolf (Mathematics, National Intelligence program), Kade Cicchella (Physics and Mathematics, graduated 2017, Ph.D. fellow at U. of Washington, Seattle), Benjamin Stortenbecker (Physics, graduated 2016, Ph.D. student at Notre Dame Univ.), Bryce Hotalen (Electrical Engineering, graduated 2013, went to Qorvo, Inc.), Christeen Bisnath (Mathematics, graduated 2012, went for Ph.D. to New Jersey Inst. of Technology), Sean Hollis (Mechanical Engineering, graduated 2011, went to Kennedy Space Center, NASA)
- **Directed Research Courses (2):** Jessica Caggiano (2017), Lukas Nabergall (graduated 2017, Ph.D. student at U. of Waterloo)

Courses Taught (at USF) (**30**)

- **Lower-level undergraduate (8):** College Algebra, Finite Mathematics, Introduction to Statistics, Business Calculus, Calculus I, Calculus II, Calculus III, Differential Equations
  - [Average student evaluations for lower-level undergraduate courses: **4.25** out of **5**]

- **Upper-level undergraduate (10):** Discrete Mathematics, Introduction to Topology, Vector Calculus, Partial Differential Equations, Symbolic Computations in Mathematics, Complex Variables, Bridge to Abstract Mathematics, Linear Algebra, Introduction to Probability Theory, Intermediate Analysis I
  - [Average student evaluations for upper-level undergraduate courses: **4.26** out of **5**]
- **Graduate (6):** Methods of Applied Mathematics, Applied Partial Differential Equations, Partial Differential Equations, Applied Complex Analysis, Probability Theory I, Probability Theory II
  - [Average student evaluations for graduate courses: **4.72** out of **5**]
- **Special-topics undergraduate (2):** From Ideas to Proofs, General Relativity
- **Special-topics graduate (4):** Foundations of Quantum Computing, Conformal Field Theory, Generalized Optimization and Algebraic Geometry, Functional Determinants

Conference Organizer (10)

- The 32nd South-East Analysis Meeting (SEAM) 2016, Tampa, March 2016.
- International Workshop on Complex Analysis and Dynamical Systems VI, Israel, May 2013.
- 2nd International Workshop on Nonlinear and Modern Mathematical Physics, Tampa, March 2013.
- International Workshop on Facets of Integrability: Random Patterns, Stochastic Processes, Hydrodynamics, Gauge Theories and Condensed Matter Systems, Simons Center, January 2013.
- *"Applications of complex analysis in mathematical physics and generalized optimization problems"*, Special session organizer, Southeastern AMS Sectional Meeting, Tampa, FL, March 2012.
- USF-UCF-UF-Southern Florida College Florida Analysis Seminar, Lakeland, FL, 2011 – 2012.
- International Workshop on Complex Analysis and Mathematical Physics, Chillan, Chile, Dec. 2010.
- Workshop on Gravitational Lensing, University of South Florida, April 2010.
- International Workshop on Classical and Quantum Information Theory, Center for Nonlinear Studies at Los Alamos National Laboratory, Santa Fe, NM, March 2008.
- Los Alamos National Laboratory-UNM-ASU-AZU Conference, Albuquerque, NM, February 2008.

Editorial Activity (25)

- Reviewer for **21** journals: *Journal of Physics A; Journal of Physics B; Physics Letters A; Physical Review Letters; Physical Reviews B; Reviews of Modern Physics; Journal of Statistical Physics; Journal of Statistical Mechanics; Advances in Analysis and Mathematical Physics; Applications and Applied Mathematics; Annales Academiae Scientiarum Fennicae Mathematica; Computational Methods and Function Theory; Constructive Approximations; Chaos, Solitons and Fractals; European Journal of Physics C; Entropy; Journal of Integrable Systems; Journal of Hydraulic Research; Journal of Mathematics and Statistics; Symmetry; American Journal of Applied Sciences.*

- Managing Editor-in-Chief, *Analysis and Mathematical Physics*, a Springer-Nature journal.
- Associate editor, *Journal of Stochastic Analysis and Applications*.
- Book reviewer, SpringerBriefs series of Springer Verlag.
- Grant reviewer for the European Science Foundation and the Israel Science Foundation.

Selected Presentations

Workshops/Conferences (past 10 years)

- The second North-Eastern Analysis Meeting, *Albany, New York,* October 2017
- Research program on Mathematical Physics, *Institut Mittag-Leffler, Stockholm, Sweden*, June 2017
- Workshop on Interface dynamics and transport phenomena at the 11th AIMS conference on Dynamical Systems, Differential Equations and Applications, *Orlando, Florida,* July 2016
- Society for Industrial and Applied Mathematics conference on Analysis of Partial Differential Equations, *Scottsdale, Arizona*, December 2015
- Israel Science Foundation research workshop on Non-Hermitean Random Matrices: 50 Years After Ginibre, *Yad Hashmona, Israel*, October 2014
- American Institute of Mathematical Sciences conference on Dynamical Systems and Differential Equations, *Madrid, Spain*, July 2014
- Conference on Complex Analysis and Dynamical Systems VI, *Bar-Ilan University and Galilee Research Center for Applied Mathematics of ORT Braude College, Israel*, May 2013 (trip cancelled)
- Research program on Complex analysis and integrable systems, *Institut Mittag-Leffler, Stockholm, Sweden*, Fall 2011
- 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

Invited Seminars/ Lectures

- Brown University, Lefschetz Center for Dynamical Systems Seminar, October 2016
  'Weak resolution of singularities in free-boundary problems of hyperbolic type"
- Caltech, Analysis Seminar, February 2012
  "Remarks on an over-determined boundary-value problem in potential theory"
- 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 Louisiana Physics Department Colloquium, February 2009
  "Pattern formation in two dimensions"
- Aspen Workshop Seminar, Aspen Center for Physics, June 2008
  "Solvable Lattice Models and Yang-Baxter Algebras"
- 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) "International Conference on Applied Mathematics and Informatics: Forum on Analysis, Geometry, and Mathematical Physics"
   conference proceedings, with Dima Khavinson, special issue of Analysis and Mathematical Physics, 2018
2) "Complex functions, operators, partial differential equations, and applications in mathematical physics"
   conference proceedings, with Erik Lundberg, special issue of Analysis and Mathematical Physics, 2018
3) "Classical and Stochastic Laplacian Growth"
   with Björn Gustafsson and Alexander Vasiliev, ISBN 978-3-319-08286-8, Birkhäuser, 2015
4) "Methods of applied mathematics: an interdisciplinary approach"
   with Iuliana Teodorescu, to be published by the Society for Industrial and Applied Mathematics

Book Chapters

5) "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.

6) "Coherent oscillations in cold Fermi atoms and their applications"
in *Leading-Edge Superconductivity Research Developments*, ISBN 978-1-60456-017-6, 2008.

Journal Articles

7) "Subharmonic representations in Quantum Hall Effect"
with Kade Chicchella, submitted to the Journal of Physics A: Mathematical and Theoretical.

8) "The Kuramoto synchronization phase transition as an U(N) effective field theory"
with Wael Al-Sawai, submitted to Europhys. Lett.

9) "Generating functions for pattern detection in large-size graphical models"
with I. Teodorescu and P. Warman, submitted to the J. of Stat. Mech.

10) "Phase space transforms resolving singularities of hyperbolic PDE"
submitted to Annals of PDE.

11) "A note on analytical models for the localization phase transition in 2D"
B. Stortenbecker and R. Teodorescu, under review at the Physical Review Letters.

12) "A free boundary problem associated with the isoperimetric inequality"
Ar. Abanov, C. Beneteau, D. Khavinson, and R. Teodorescu, http://arXiv:1601.03885,
submitted to the Journal of the American Mathematical Society

13) "Efficient algorithms for topological inference on random graphs"
I. Teodorescu, R. Teodorescu, and Pranav Warman, http://arXiv:1512.09193.

14) "Braid group representations and cold Fermi gases in the fast pairing regime"
B. Hotalen and R. Teodorescu, http://arXiv:1501.00132 [math-ph].

15) "Topological constraints in geometric deformation quantization on domains with multiple boundary components"
http://arXiv:1412.7716 [math-ph].

16) "An Overdetermined Problem in Potential Theory"
D. Khavinson, E. Lundberg, and R. Teodorescu, Pacific Journal of Mathematics, **265** 1 (2013) 85.

17) "Universal limits of nonlinear measure redistribution processes and their applications"
R. Teodorescu, Journal of Problems of Nonlinear Analysis in Engineering Systems (2012).

18) "Viscous shocks in Hele-Shaw flow and Stokes phenomena of the Painlevé I transcendent"
S-Y. Lee, R. Teodorescu and P. Wiegmann, Physica D 240, no. 13, 1080-1091 (2011).

19) "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.

20) "Lemniscates are destroyed by Laplacian growth"
D. Khavinson, M. Mineev-Weinstein, M. Putinar and R. Teodorescu, Mathematical Research Letters **17** 2 (2010) 337.

21) "Non-equilibrium thermodynamics and topology of currents"
V. Chernyak, M. Chertkov, S. Malinin and R. Teodorescu, J. of Stat. Phys. **137** 1 (2009) 109.

22) "Shocks and finite-time singularities in Hele-Shaw flow"
S-Y. Lee, R. Teodorescu and P. Wiegmann, Physica D: Nonlinear Phenomena 238 (2009) 1113.

23) "Belief Propagation and Loop Series on Planar Graphs"
M. Chertkov, V. Chernyak and R. Teodorescu, J. Stat. Mech. (2008) P05003.

24) "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**).

25) "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).

26) "Relaxation of nonlinear oscillations in BCS superconductivity"
R. Teodorescu, J. of Phys. A: Math. Gen. **39** (2006) 10363.

27) "Generic critical points of normal matrix ensembles"
R. Teodorescu, J. of Phys. A: Math. Gen. **39** (2006) 8921.

28) "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.

29) "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.

30) "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.