
Contact Information

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Professional Appointments

August 2016 - Present: Associate Professor, Applied Mathematics Department, University of Colorado, Boulder, Colorado, USA.

August 2008 - July 2016: Assistant Professor, Applied Mathematics Department, University of Colorado, Boulder, Colorado, USA.

August 2006 - June 2008: Postdoctoral Researcher, Physics Department, Northeastern University, Boston, Massachusetts, USA.

June 2005 - June 2006: Postdoctoral Researcher, Institute for Research in Electronics and Applied Physics, University of Maryland, College Park, Maryland, USA.

January 2002 - May 2005: Graduate Research Assistant, Institute for Research in Electronics and Applied Physics, University of Maryland, College Park, Maryland, USA.

Research Interests

Dynamics on and structure of complex networks.

Synchronization.

Nonlinear dynamics and chaos.

Spread of information and disease in complex social networks.

Criticality in functional brain networks.

Education

Ph.D., Applied Mathematics, University of Maryland, College Park, May 2005. Advisors: Edward Ott, Brian R. Hunt.

M.S., Mathematics, Universidad de los Andes, Colombia, May 2002. Advisor: Sergio Fajardo.

B.S., Physics, Universidad de los Andes, Colombia, March 1999. Advisors: Victor Tapia, Rolando Roldan.

Ph.D. and M.S. Students

The current position of graduated Ph.D. students is included.

Sabina Adhikari, Ph.D., expected May 2024.

Corbit Sampson, Ph.D., expected May 2024.

Rebecca Cohen, M.S., completed May 2023.

Nicholas Landry, Ph.D., completed May 2022. Currently a postdoctoral researcher at the University of Vermont.

Yogesh Virkar, Ph.D., completed May 2017. Currently employed at Amazon Web Services.

Warren Lord, M.S., completed May 2014.

Dane R. Taylor, Ph.D., completed May 2013. Currently an Assistant Professor at SUNY Buffalo Mathematics Department.

Per Sebastian Skardal, Ph.D., completed May 2013. Currently an Associate Professor at Trinity College Mathematics Department.

Marshall Y. Carpenter, M.S., completed May 2012.

Daniel B. Larremore, Ph.D., completed May 2012. Currently an Assistant Professor at CU Boulder Computer Science Department.

Publications

Publications in Peer-Reviewed Journals

1. Zhong-Ke Gao, Dibakar Ghosh, Heather A. Harrington, **Juan G. Restrepo**, and Dane Taylor, Dynamics on networks with higher-order interactions, *Chaos* 33, 040401 (2023).
2. Sabina Adhikari, **Juan G. Restrepo**, and Per Sebastian Skardal, Synchronization of phase oscillators on complex hypergraphs, *Chaos* 33, 033116 (2023).
3. Per Sebastian Skardal, Sabina Adhikari, and **Juan G. Restrepo**, Multistability in coupled oscillator systems with higher-order interactions and community structure, *Chaos* 33, 023140 (2023).
4. Milad Rahimi-Majd, **Juan G. Restrepo**, and Morteza Nattagh-Naja , Stochastic and deterministic dynamics in networks with excitable nodes, *Chaos* 33, 023134 (2023).
5. Nicholas W. Landry and **Juan G. Restrepo**, Hypergraph dynamics: Assortativity and the expansion eigenvalue, *Chaos* 32, 053113 (2022).
6. Lucille Calmon, **Juan G. Restrepo**, Jose Joaquin Torres, Ginestra Bianconi, Dirac synchronization is rhythmic and explosive, *Communications Physics* 5, 1-17 (2022).
7. Damien Beccroft, **Juan G. Restrepo**, David Angulo-Garcia, Greedy optimization for growing spatially embedded oscillatory networks, *Phys. Rev. E* 106, 034304 (2022).
8. Reza Ghorbanchian, **Juan G. Restrepo**, Joaquin J. Torres, and Ginestra Bianconi, Higher-order simplicial synchronization of coupled topological signals, *Communications Physics* 4 (1), 1-13 (2021).
9. Nicholas Landry and **Juan G. Restrepo**, Effect of heterogeneity on hypergraph contagion models, *Chaos* 30, 103117 (2020).
10. Perrin Ruth and **Juan G. Restrepo**, Dodge and survive: modeling the predatory nature of dodgeball, *Phys. Rev. E* 102(6), 062302 (2020) [8 pages].
11. Kathleen Finlinson, Woodrow L. Shew, Daniel B. Larremore, **Juan G. Restrepo**, Optimal control of excitable systems near criticality, *Physical Review Research* 2 (3), 033450 (2020).

25. Per Sebastian Skardal and **Juan G. Restrepo**, Coexisting chaotic and multi-periodic dynamics in a model of cardiac alternans, *Chaos* 24, 043126 [8 pages] (2014).
26. Prasanna Madhusudhanan, **Juan G. Restrepo**, Youjian (Eugene) Liu, Timothy X. Brown, and Kenneth Baker, Downlink Performance Analysis for a Generalized Shotgun Cellular System, *IEEE Transactions on Wireless Communications* 13, 6684 [13 pages] (2014).
27. **Juan G. Restrepo**

39. Per Sebastian Skardal, Edward Ott, Juan G. Restrepo, Cluster Synchrony in Systems of Coupled Phase Oscillators with Higher-Order Coupling, *Phys. Rev. E* 84, 036208 [10 pages] (2011).
40. Wai Shing Lee, Juan G. Restrepo, Edward Ott, Thomas M. Antonsen, Dynamics and Pattern Formation in Large Systems of Spatially-Coupled Oscillators with Finite Response Times, *Chaos* 21, 023122 [14 pages] (2011).
41. Dane Taylor, Juan G. Restrepo, Network connectivity during mergers and growth: Optimizing the addition of a module, *Phys. Rev. E* 83, 066112 [7 pages] (2011).
42. Daniel B. Larremore, Woodrow L. Shew, Edward Ott, and Juan G. Restrepo, Effects of network topology, transmission delays, and refractoriness on the response of coupled excitable systems to a stochastic stimulus, *Chaos* 21, 025117 [10 pages] (2011).
43. Daniel B. Larremore, Woodrow L. Shew, Juan G. Restrepo, Predicting criticality and dynamic range in complex networks: effects of topology, *Physical Review Letters* 106, 058101 [4 pages] (2011).
44. Dane Taylor, Edward Ott, and Juan G. Restrepo, Spontaneous synchronization of coupled oscillator systems with frequency adaptation, *Phys. Rev. E* 81, 046214 [8 pages] (2010).
45. Juan G. Restrepo and Alain Karma, Spatiotemporal intracellular calcium dynamics during cardiac alternans, *Chaos* 19, 037115 [15 pages] (2009).
46. Juan G. Restrepo and Alain Karma, Line-defect patterns of unstable spiral waves in cardiac tissue, *Physical Review E* 79, 030906(R) [4 pages] (2009).
47. Juan G. Restrepo, James N. Weiss, and Alain Karma, Calsequestrin Mediated Mechanism for Cellular Calcium Transient Alternans, *Biophysical Journal* 85, 3767 [23 pages] (2008).
48. Aman Mahajan, Yohannes Shiferaw, Daisuke Sato, Ali Baher, Riccardo Olcese, Lai-Hua Xie, Ming-Jim Yang, Peng-Shen Chen, Juan G. Restrepo, Alain Karma, Alan

39. Per Sebastian Skardal, Edward Ott, Juan G. Restrepo, Cluster Synchrony in Systems of Coupled Phase Oscillators with Higher-Order Coupling, *Phys. Rev. E* 84, 036208 [10 pages] (2011).
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27. Juan G. Restrepo

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4. Milad Rahimi-Majd, Juan G. Restrepo, and Morteza Nattagh-Naja, Stochastic and deterministic dynamics in networks with excitable nodes, *Chaos* 33, 023134 (2023).
5. Nicholas W. Landry and Juan G. Restrepo, Hypergraph dynamics: Assortativity and the expansion eigenvalue, *Chaos* 32, 053113 (2022).
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Department Service

PUEC for Sujeet Bhat's reappointment, 2020.
PUEC for Adrianna Gillman's tenure, 2020.
PUEC for Zackary Kilpatrick's tenure, 2019.
PUEC for Zackary Kilpatrick's promotion, 2017.
PUEC for Ian Grooms' promotion, 2018.
Graduate Committee, 2010-2011, 2013-2014, 2014-2015, 2015-2016, 2017-2018, 2018-2019, 2022.
PDE Preliminary Exam Committee, 2010, 2011, 2014, 2016, 2017, 2019, 2020, 2022.
Awards Committee, 2017-2018.
Faculty Search Committee, 2014.
Colloquium Chair, 2012-2013, 2021.
Instructor Search Committee, 2011-2012.
Instructor Search Committee, 2008-2009.

Conferences and mini-symposia organized

Co-organizer of the workshop "Contagion on Complex Social Systems", Boulder, Colorado, 2022.
Co-organizer of mini-symposium on "Dynamics on networks with higher-order interactions", SIAM Conference on Applications of Dynamical Systems, remote, 2021.
Mini-symposium "Applications of machine learning to the analysis of nonlinear dynamical systems", 2020 JMM Meeting in Denver. Co-organizer with Maziar Raissi.
Dynamics Days US 2018, Denver, Colorado, January 2018. Chair of the organizing committee.
Invited session "Applications of synchronization in the micro and macro world", 2014 APS March Meeting in Denver. Co-organizer with Arkady Pikovsky.
Information, Instability and Fragility in Networks: Methods and Applications. Workshop held in Boulder, Colorado, November 2013. Co-organizer with Michael Stutzer.
Dynamics Days US 2013, Denver, Colorado, January 2013. Chair of the organizing committee.
Mini-symposium on "Criticality and Dynamic Range in Neuronal Networks", SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, 2011. Co-organizer with Woodrow Shew.

Ph.D. Dissertation Committees

Subekshya Bidari, Applied Mathematics, 2022.
Graham Kessler O'Connor, Applied Mathematics, 2022.
Daniel Ferguson, Applied Mathematics, 2022.
Lindsey Wong, Applied Mathematics, 2022.
Nicholas Landry, Applied Mathematics, 2022.
Sabina Altus, Applied Mathematics, 2021.
Amanda Hampton, Applied Mathematics, 2021.

Harry Dudley, Applied Mathematics, 2020.
Anna Broido, Applied Mathematics, 2020.
Peiru He, Physics, 2019.
Peter Wills, Applied Mathematics, 2018
Bihui Zhu, Physics, 2017.
Andrew Koller, Physics, 2017.
Yogesh Virkar, Computer Science, 2017.
Rebecca Mitchell, Applied Mathematics, 2017.
Ashar Ali, Applied Mathematics, 2016.
Joshua Weiner, Physics, 2015.
Adam Kaufman, Physics, 2015.
Paul V. Anderson, Aerospace Engineering, 2015.
Nathan D. Monnig, Applied Mathematics, 2015.
Michael Brutz, Applied Mathematics, 2014.
Henry Romero, Applied Mathematics, 2014.
Dustin Keck, Applied Mathematics, 2014.
Sekson Sirisubtawee, Applied Mathematics, 2014.
Sebastian Skardal, Applied Mathematics, 2013.
Dane Taylor, Applied Mathematics, 2013.
Theodore Galanthay, Applied Mathematics, 2013.
Adam Fox, Applied Mathematics, 2013.
Brock Mosovsky, Applied Mathematics, 2012.
Chester P. Rubbo, Physics, 2012.
Daniel B. Larremore, Applied Mathematics, 2012.
Zachary Alexander, Applied Mathematics, 2012.
Jerrad Hampton, Applied Mathematics, 2012.
Kye Taylor, Applied Mathematics, 2011.
Jinyu Li, Applied Mathematics, 2010.

Master's Dissertation Committees

Jackson Curry, Applied Mathematics, 2022.
Perrin Ruth, Applied Mathematics, 2021.
Nikhil Krishnan, Applied Mathematics, 2019.
Ankit Saxena, Electrical, Computer, and Energy Engineering, 2016.
Amy Le, Applied Mathematics, 2015.
Thomas Trantow, Applied Mathematics, 2014.
Juan Ramirez Jr, Electrical, Computer, and Energy Engineering, 2012.
Jason De Salvo, Applied Mathematics, 2010.
Naveen Mysore Balasubramanian, Electrical Engineering, 2012.

Miscellaneous Service

Co-organized the CU-Boulder Applied Math Dynamics and Complex Systems Seminar, 2009-2022.

Served on the admissions committee for the IQ-Bio program at CU Boulder.

Served on the mentoring committee for the IQ-Bio program at CU Boulder.

Gave presentations to high school students in the "Colorado Math Circle".