Curriculum Vitae

Richard Sebastian Eydam

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Neural Circuits and Computations Unit
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Positions

Postdoctoral Researcher Neural Circuits and Computations Unit 2021–
RIKEN Center for Brain Science, Wako, Japan

Researcher Laser Dynamics Research Group 2015–2019
Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany
Project: CRC-910 „Control of self-organizing nonlinear systems“, A3: „Self-organization and control in coupled networks and time-delayed systems“

Research Interests

My research focuses on nonlinear dynamical systems, in particular, coupled oscillators and excitable systems with applications to neuroscience. I use numerical and analytical methods with focus on the study of bifurcations and phase transitions. My goal is to introduce detailed models in neuroscience addressing neurological disorders, e.g. epilepsy.

Education

PhD Department of Mathematics and Natural Sciences 2019
Technical University of Berlin, Germany
Thesis: *Mode-locking in Systems of Globally-Coupled Phase Oscillators*

M. Sc. Department of Physics, Free University of Berlin 2011–2014
Student exchange, Department of Physics Uppsala University, Sweden 2012–2013
Master thesis, Free University Berlin, Nonlinear Dynamics Group:
Thesis: *Chaos in Cosmological Models with Scalar Fields*

B. Sc. Department of Physics, Free University of Berlin 2007–2011
Thesis: *Influence of capping-potentials on the electronic structure of double bonds*

Publications

Eydam, Sebastian; Wolfrum, Matthias
Mode locking in systems of globally-coupled phase oscillators. Appeared in: Phys. Rev. E, 96 (2017), pp. 052205/1–052205/8; DOI 10.1103/PhysRevE.96.052205

Eydam, Sebastian; Wolfrum, Matthias
The link between coherence echoes and mode locking. Appeared in: Chaos 29, 103114 (2019); DOI 10.1063/1.5114699

Eydam, Sebastian; Franović, Igor; Wolfrum, Matthias
Leap-frog patterns in systems of two coupled FitzHugh–Nagumo units. Appeared in: Phys. Rev. E, 99 (2019), pp. 042207/1–042207/9; DOI 10.1103/PhysRevE.99.042207

Eydam, Sebastian
Mode locking in systems of globally-coupled phase oscillators.
Dissertation: http://dx.doi.org/10.14279/depositonce-8576 (2019)

Franović, Igor; Yanchuck, Serhiy; Eydam, Sebastian; Wolfrum, Matthias; Iva Bačić
Dynamics of a stochastic excitable system with slowly adapting feedback. Appeared in: Chaos 30, 083109 (2020); https://doi.org/10.1063/1.5145176

Franović, Igor; Eydam, Sebastian; Semenova, Nadezhda; Zakharova, Anna
Unbalanced clustering and solitary states in coupled excitable systems. Appeared in: Chaos 32, 011104 (2022); https://doi.org/10.1063/5.0077022.

Franović, Igor; Eydam, Sebastian; Yanchuck, Serhiy; Rico Berner
Collective Activity Bursting in a Population of Excitable Units Adaptively Coupled to a Pool of Resources. Appeared in: Frontiers in Network Physiology, Sec. Networks of Dynamical Systems, Volume 2 (2022); https://doi.org/10.3389/fnetp.2022.841829.

Franović, Igor; Eydam, Sebastian
Patched patterns and emergence of chaotic interfaces in arrays of nonlocally coupled excitable systems. Appeared in: Chaos 32, 091102 (2022); https://doi.org/10.1063/5.0111507.

Eydam, Sebastian; Franović, Igor; Louis, Kang
Control of seizure-like dynamics in neuronal populations with excitability adaptation related to ketogenic diet. Appeared in: Chaos 34, 053128 (2024); https://doi.org/10.1063/5.0180954.

Projects

CRC-910 Member: collaborative research center funded by the DFG
Project: *Control of self-organizing nonlinear systems, A3: Self-organization and control in coupled networks and time-delayed systems*

Scientific exchange: Belgrade institute of Physics, Serbia, funded by the DAAD
Project: *Emergent Dynamics in Systems of Coupled Excitable Units*

Unpublished Works and Preprints

Eydam, Sebastian
Chaos in Cosmological Models with Scalar Fields, Free University Berlin thesis (2015)

Editorial work

Guest editor in "Chaos: An interdisciplinary Journal of Nonlinear Science"

Focus Issue: *Regime switching in coupled nonlinear systems: sources, prediction, and control* 2022-2024

Review editor in "Frontiers in Network Physiology" in the section "Networks of Dynamical Systems" 2023-

Reviewer for: Nonlinear Dynamics, SIAM J. on Applied Dynamical Systems

Conferences

Patterns of Dynamic, (Germany, Berlin)	2016
Control of Complex Systems and Networks, (Germany, Usedom)	2016
Dynamics Days Europe, (UK, Loughborough)	2018
Control of Self-Organizing Nonlinear Systems, (Germany, Warnemünde)	2018
Dynamics Days Europe, (Germany, Rostock)	2019
Bernstein Conference (online)	2021
Society for Neuroscience (online)	2021
COSYNE (Portugal, Lisbon)	2022
Bernstein Conference (Germany, Berlin)	2022
Society for Neuroscience (USA, San-Diego)	2022
COSYNE (Canada, Montreal)	2023
Annual Meeting of the Japan Neuroscience Society (Japan, Sendai)	2023
Dynamics Days Europe (Italy, Naples)	2023
IBRO (Spain, Granada)	2023
Bernstein Conference (Germany, Berlin)	2023
2nd RIKEN CBS Co-Creation International Conference (Japan, Wako)	2023
COSYNE (Portugal, Lisbon)	2024

Workshops

Waves, Solitons and Turbulence in Optical Systems, (WIAS, Berlin)	2015
Synchronization and oscillators with generalized coupling, (University of Exceter)	2016
Control of Self-Organizing Nonlinear Systems, (Wittenberg, Germany)	2015, 2017
Nonlinear Dynamics in Semiconductor Lasers, (WIAS, Berlin)	2016
Dynamics of Delay Equations, (WIAS, Berlin)	2016
Nonlinear Waves and Turbulence in Optics and Hydrodynamics, (WIAS, Berlin)	2017
Optical Solitons and Frequency Combs, (WIAS, Berlin)	2019
Adaptivity in nonlinear dynamical systems, (PIK, Potsdam, Germany)	2022

Teaching

Lab instructor: Department of Physics, Free University Berlin 2010-2011, 2014

Instructing and supervising experiments in optics, electronics, mechanics, and mathematics introductions

Private tutor: 2015, 2019-2020
Topics: linear algebra, physics, and calculus and stochastics (for economists and construction engineers)

Mentoring:
RIKEN CBS Summer Program: student Ignacio Taguas Garzón 2023

Lectures & seminars:
RIKEN - Center for Brain Science 2023
Guided reading seminar: *A First Course In Probability* (ISBN-10: 0-321-79477-X)

References

Dr. Louis Kang
Neural Circuits and Computations Unit (unit leader)
RIKEN - Center for Brain Science
louis.kang@riken.jp

Prof. Dr. Igor Franović
Collaborator and mentor
Institute of Physics Belgrade
franovic@ipb.ac.rs

Dr. Matthias Wolfrum
PhD adviser, vice group leader
Weierstrass Institute for Applied Analysis and Stochastics
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