Curriculum vitae

Gábor Drótos

Institute for Nuclear Research,
Debrecen, Hungary

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PERSONAL DATA

- Name: **Gábor Drótos**
- Year of birth: 1987
- Email: `drotos@general.elte.hu`
- Homepage: `http://theorphys.elte.hu/~drotos/`

OCCUPATION

From April 2022	**Research fellow** in the "Experimentally-oriented Device Independent CrypTography" QuantERA research project at the **Institute for Nuclear Research**, Eötvös Loránd Research Network; *Debrecen, Hungary*
From April 2021 to May 2021	**Postdoctoral researcher** in the "LINCNETS" research project at the **Institute for Cross-disciplinary Physics and Complex Systems**, University of the Balearic Islands and CSIC; *Palma de Mallorca, Spain*
From January 2019 to March 2021	**Postdoctoral researcher** funded by the "Margalida Comas" research grant of the Government of the Balearic Islands at the **Institute for Cross-disciplinary Physics and Complex Systems**, University of the Balearic Islands and CSIC; *Palma de Mallorca, Spain*
From February 2017 to December 2018	**Postdoctoral researcher** in the "Lagrangian studies of oceanic processes" research project at the **Institute for Cross-disciplinary Physics and Complex Systems**, University of the Balearic Islands and CSIC; *Palma de Mallorca, Spain*
From February 2014 to January 2017	**Assistant research fellow** at **MTA–ELTE Theoretical Physics Research Group**, Hungarian Academy of Sciences and Eötvös Loránd University; *Budapest, Hungary*

PROFESSIONAL ACTIVITY

Research interests

- Quantum information theory
- Chaotic dynamics
- Transient chaos
- Nonautonomous dynamical systems
- Climate variability
- Particle transport in environmental flows

Publications

1. G. Drótos and T. Tél, "Chaotic saddles in a gravitational field: The case of inertial particles in finite domains". *Phys. Rev. E* **83**, 056203 (2011). https://doi.org/10.1103/PhysRevE.83.056203

2. G. Drótos, C. Jung and T. Tél, "When is high-dimensional scattering chaos essentially two-dimensional? Measuring the product structure of singularities". *Phys. Rev. E* **86**, 056210 (2012). https://doi.org/10.1103/PhysRevE.86.056210

3. G. Drótos, T. Tél and G. Kovács, "Modulated point-vortex pairs on a rotating sphere: Dynamics and chaotic advection". *Phys. Rev. E* **87**, 063017 (2013). https://doi.org/10.1103/PhysRevE.87.063017

4. F. Gonzalez, G. Drotos and C. Jung, "The decay of a normally hyperbolic invariant manifold to dust in a three degrees of freedom scattering system". *J. Phys. A* **47**, 045101 (2014). https://doi.org/10.1088/1751-8113/47/4/045101

5. G. Drotos, F. Gonzalez, C. Jung and T. Tél, "Asymptotic observability of low-dimensional powder chaos in a three-degrees-of-freedom scattering system". *Phys. Rev. E* **90**, 022906 (2014). https://doi.org/10.1103/PhysRevE.90.022906

6. G. Drótos and T. Tél, "On the validity of the β-plane approximation in the dynamics and the chaotic advection of a point vortex pair model on a rotating sphere". *J. Atmos. Sci.* **72**, 415–429 (2015). https://doi.org/10.1175/JAS-D-14-0101.1

7. G. Drótos, T. Bódai and T. Tél, "Probabilistic concepts in a changing climate: A snapshot attractor picture". *J. Climate* **28**, 3275–3288 (2015). https://doi.org/10.1175/JCLI-D-14-00459.1

8. M. Herein, J. Márfy, G. Drótos and T. Tél, "Probabilistic concepts in intermediate-complexity climate models: A snapshot attractor picture". *J. Climate* **29**, 259–272 (2016). https://doi.org/10.1175/JCLI-D-15-0353.1

9. G. Drótos and C. Jung, "The chaotic saddle of a three degrees of freedom scattering system reconstructed from cross-section data". *J. Phys. A* **49**, 235101 (2016). https://doi.org/10.1088/1751-8113/49/23/235101

10. G. Drótos, T. Bódai and T. Tél, "Quantifying nonergodicity in nonautonomous dissipative dynamical systems: An application to climate change". *Phys. Rev. E* **94**, 022214 (2016). https://doi.org/10.1103/PhysRevE.94.022214

11. M. Herein, T. Haszpra, G. Drótos, J. Márfy and T. Tél, "The theory of parallel climate realizations as a new framework for teleconnection analysis". *Sci. Rep.* **7**, 44529 (2017). https://doi.org/10.1038/srep44529

12. G. Drótos, T. Bódai and T. Tél, "On the importance of the convergence to climate attractors". *Eur. Phys. J. Spec. Top.* **226**, 2031–2038 (2017). https://doi.org/10.1140/epjst/e2017-70045-7

13. G. Drótos, P. Monroy, E. Hernández-García, C. López, "Inhomogeneities and caustics in the sedimentation of noninertial particles in incompressible flows". *Chaos* **29**, 013115 (1–25) (2019). https://doi.org/10.1063/1.5024356

14. P. Monroy, G. Drótos, E. Hernández-García, C. López, "Spatial inhomogeneities in the sedimentation of biogenic particles in ocean flows: analysis in the Benguela region". *Journal of Geophysical Research: Oceans* **124**, 4744–4762 (2019). https://doi.org/10.1029/2019JC015016

15. T. Tél, T. Bódai, G. Drótos, T. Haszpra, M. Herein, B. Kaszás, M. Vincze, "The theory of parallel climate realizations: A new framework of ensemble methods in a changing climate - an overview". *Journal of Statistical Physics* **179**, 1496–1530 (2020). https://doi.org/10.1007/s10955-019-02445-7

16. G. Drótos, T. Becker, T. Mauritsen, B. Stevens, "Global variability in radiative-convective equilibrium with a slab ocean under a wide range of CO2 concentrations". *Tellus* **72**, 1–19 (2020). https://doi.org/10.1080/16000870.2019.1699387

17. T. Bódai, G. Drótos, M. Herein, F. Lunkeit, V. Lucarini, "The Forced Response of the El Niño–Southern Oscillation–Indian Monsoon Teleconnection in Ensembles of Earth System Models", *J. Climate* **33**, 2163–2182 (2020). https://doi.org/10.1175/JCLI-D-19-0341.1

18. A. Sozza, G. Drótos, E. Hernández-García, C. López, "Accumulated densities of sedimenting particles in turbulent flows". *Phys. Fluids* **32**, 075104 (1–11) (2020). https://doi.org/10.1063/5.0003614

19. R. de la Fuente, G. Drótos, E. Hernández-García, C. López, E. van Sebille, "Sinking microplastics in the water column: simulations in the Mediterranean Sea". *Ocean Sci.* **17**, 431–453 (2021). https://doi.org/10.5194/os-17-431-2021

20. T. Bódai, G. Drótos, K.-J. Ha, J.-Y. Lee, E.-S. Chung, "Nonlinear forced change and nonergodicity: The case of ENSO–Indian monsoon and global precipitation teleconnections". *Front. Earth Sci.* **8**, 599785 (2021). https://doi.org/10.3389/feart.2020.599785

21. G. Drótos, E. Hernández-García, C. López, "Local characterization of transient chaos on finite times in open systems". *J. Phys. Complex.* **2**, 025014 (2021). https://doi.org/10.1088/2632-072X/abe5f7

22. R. de la Fuente, G. Drótos, E. Hernández-García, C. López, "Network and geometric characterization of three-dimensional fluid transport between two layers". *Phys. Rev. E* **104**, 065111 (1–12) (2021).

Teaching, supervision

- In each autumn semester from 2011 to 2016: practical course in theoretical mechanics at the Eötvös Loránd University, Budapest, Hungary

- Supervision of István Bozsó's work at the Scientific Students' Associations (winning a first prize in the section "Aerial environment" at the national conference in 2015), and of his bachelor thesis work at the Eötvös Loránd University, both entitled "The investigation of rain drops moving in clouds by means of snapshot attractors"

EDUCATION

2011–2014

PhD in Physics
PhD School of Physics,
Eötvös Loránd University, Budapest, Hungary
Supervisor: Tamás Tél, `http://theorphys.elte.hu/~tel/`
Defence on 04.03.2016, grade: summa cum laude
PhD thesis:
"The application of the theory of dynamical systems in conceptual models of environmental physics"
`http://theorphys.elte.hu/~drotos/Thesis/Thesis_DG.pdf`

2009–2011

Professional qualification of Physicist
MSc programme in Physics,
module for statistical physics and complex systems,
Eötvös Loránd University, Budapest, Hungary
Final examination in 2011, grade: with honours
Master's thesis:
"Transient chaos in environmental phenomena — a cloud model and a vortex pair on a rotating sphere"

2006–2009

Professional qualification of Physicist
BSc programme in Physics,
Eötvös Loránd University, Budapest, Hungary
Final examination in 2009, grade: with honours
Bachelor's thesis:
"Chaotic behaviour in clouds? — Aerosols in a simple flow model"

PROGRAMMING SKILLS

- Advanced: C, bash and related scripting languages (awk, etc.), Gnuplot, Climate Data Operators (CDO), XHTML, CSS3
- Beginner: python, Qiskit, C++, Fortran 90, MATLAB, PHP, MySQL

LANGUAGE SKILLS

Mother tongue

Hungarian

Further languages

	Understanding		Speaking		Writing
	Listening	Reading	Spoken interaction	Spoken production	
English	B2	C1	B2	B2	C1
French	A2	B1	A2	A2	A2
Spanish	A1	B1	A1	A1	A2

(Levels of the Common European Framework of Reference for Languages: A1/2: Basic user – B1/2: Independent user – C1/2: Proficient user)