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date of birth:	23th July 1989
citizenship:	Romanian

current

2018 - **Assistant professor, Department of Physics, Babeș-Bolyai University, Cluj-Napoca, Romania**

work experience

2017 - 2018 **Visiting researcher, Department of Physics, Babeș-Bolyai University, Cluj-Napoca, Romania**
ADVISOR: **Prof. Zoltán Néda**

2017 - 2018 **Postdoctoral researcher, Institute for Theoretical Physics, Goethe University, Frankfurt am Main, Germany**
ADVISOR: **Prof. Claudius Gros**

education

2013 - 2017 **PhD in Physics, Institute for Theoretical Physics, Goethe University, Frankfurt am Main, Germany**
ADVISOR: **Prof. Claudius Gros**

2011 - 2013 **MSc in Computational Physics, Department of Physics, Babeș-Bolyai University, Cluj-Napoca, Romania**
ADVISOR: **Prof. Zoltán Néda**

2008 - 2011 **BSc in Physics, Department of Physics, Babeș-Bolyai University, Cluj-Napoca, Romania**
ADVISOR: **Prof. Zoltán Néda**, **Asst. Ferenc Járai-Szabó**

2004 - 2008 **High school, Orbán Balázs Gimnázium, Cristuru-Secuiesc, Romania**

teaching

2018 - **Courses, seminars and lab activities at the Department of Physics, Babes-Bolyai University, Cluj-Napoca, Romania**
Dynamical Systems, Robophysics, Thermodynamics, Physics Education, Teaching Physics

2017 **Course (substitution) at ITP, Goethe University Frankfurt, Germany**
Complex and adaptive dynamical systems

2013 - 2017 **Tutorials at ITP, Goethe University Frankfurt, Germany**
Electrodynamics, Self-Organisation: Theory and Simulations, Programming for Physicists, Complex and adaptive dynamical systems, Advanced Introduction to C++ and Scientific Computing

languages

Hungarian	**native**
Romanian	**good**
English	**good**
German	**intermediate**

computational skills

programing	**Julia, Python, C, C++, Java, Fortran**
office	**Latex, Inkscape, Vi, Libre Office**

visits

2019	**Goethe University Frankfurt, Frankfurt am Main, Germany (2 weeks)** HOST: **Prof. Claudius Gros**
2018	**University of Helsinki, Helsinki, Finland (1 week)** HOST: **Prof. Hannu Salmi**
2018	**Goethe University Frankfurt, Frankfurt am Main, Germany (2 weeks)** HOST: **Prof. Claudius Gros**
2012 - 2013	**Eötvös Loránd University, Budapest, Hungary (6 months)** ADVISOR: **Prof. Tél Tamás**
2011	**University of Bergen, Bergen, Norway (2 weeks)** ADVISOR: **Prof. Zoltán Néda**

schools

2016	**Advanced Course on "Piecewise Smooth Dynamical Systems"** CRM, Universitat Autonòma de Barcelona, Barcelona, Spain
2015	**INCF Short Course on Information Processing in Neural Systems** Institute of Cognitive Science, Osnabrück, Germany
2015	**Interdisciplinary College** Gesellschaft für Informatik, Günne, Germany
2014	**Winter School in Quantitative Systems Biology** International Centre for Theoretical Physics, Trieste, Italy
2011	**IPP Summer University on Plasma Physics and Fusion Research** Max Planck Institute for Plasma Physics, Greifswald, Germany

awards

2018 **Young Researcher Award**
by Regional Committee in Cluj of the Hungarian Academy of Sciences at Hungarian Science Festival (Magyar Tudomány Ünnepe), Cluj-Napoca, Romania

2016 **2nd Poster Prize**
by Advisory board of Dynamics Days Europe at XXXVI Dynamics Days Europe 2016, Corfu, Greece

2016 **Travel award**
by U.S. National Science Foundation at Dynamics Days US 2016, Durham, NC, USA

2014 **Poster Prize Winner**
by F1000 Research at OCCAM 2014, Osnabrück, Germany

grants, fellowships

2020 - 2022 **Postdoctoral Research Grant PN-III-P1-1.1-PD-2019-0742-110, Attractoring - A complex systems framework for the physics of robotic locomotion)**
Romanian National Authority for Scientific Research and Innovation, CNCS/CCCDI-UEFISCDI, Bucharest, Romania

2021 - 2022 **Grant for Supporting Competitivity AGC36781/08.12.2021)**
by Babes-Bolyai University,Cluj-Napoca, Romania

2020 - 2021 **Grant for Supporting Competitivity AGC30689/20.02.2020, AGC30690/20.02.2020, AGC30691/20.02.2020)**
by Babes-Bolyai University,Cluj-Napoca, Romania

2018 - 2019 **Grant for Supporting Competitivity AGC33400/13.08.2018**
by Babes-Bolyai University,Cluj-Napoca, Romania

2012 - 2015 **Over-the Border Excellent Student Scholarship**
by National Excellence Program, Office of Public Administration and Justice, Budapest, Hungary

2012 - 2015 **Collegium Talentum Scholarship**
by Collegium Talentum, Tatabánya, Hungary

papers

2021 **A Novel Measure Inspired by Lyapunov Exponents for the Characterization of Dynamics in State-Transition Networks**
Bulcsú Sándor, Bence Schneider, Zsolt I. Lázár, Mária Ercsey-Ravasz, Entropy **23(1)**: 103

2021 **Charting closed-loop collective cultural decisions: from book best sellers and music downloads to Twitter hashtags and Reddit comments**
Lukas Schneider, Johannes Scholten, **Bulcsú Sándor**, Claudius Gros, The European Journal of Physics B **94(8)**: 1-13

2021 **Synchronization patterns in rings of time-delayed Kuramoto oscillators**
Károly Dénes, **Bulcsú Sándor**, Zoltán Néda, Communications in Nonlinear Science and Numerical Simulation **93**: 10550578

2020 **Flickering candle flames and their collective behavior**
Attila Gergely, **Bulcsú Sándor**, Csaba Paizs, Robert Tötös, Zoltán Néda, Scientific Reports **10(1)**: 21305

2019 **Chaos in time delay systems, an educational review**
Hendrik Wernecke, **Bulcsú Sándor**, Claudius Gros, Physics Reports (in press)

2019 **On the predictability of the final state in a ring of Kuramoto rotators**
Károly Dénes, **Bulcsú Sándor**, Zoltán Néda, Romanian Reports in Physics **71**(108)

2019 **Embodied robots driven by self-organized environmental feedback**
Frederike Kubandt, Michael Nowak, Tim Koglin, Claudius Gros, **Bulcsú Sándor**, Adaptive Behavior 105971231985562

2019 **When the goal is to generate a series of activities: A self-organized simulated robot arm**
Tim Koglin, **Bulcsú Sándor**, Claudius Gros, Plos ONE **14**(6):e0217004

2019 **Pattern selection in a ring of Kuramoto oscillators**
Károly Dénes, **Bulcsú Sándor**, Zoltán Néda, Communications in Nonlinear Science and Numerical Simulation **78**:104868

2018 **Attractor metadynamics in terms of target points in slow-fast systems: adiabatic versus symmetry protected flow in a recurrent neural network**
Hendrik Wernecke, **Bulcsú Sándor**, Claudius Gros, Journal of Physics Communications **2**:095008

2018 **Kick Control: Using the Attracting States Arising Within the Sensorimotor Loop of Self-Organized Robots as Motor Primitives**
Bulcsú Sándor, Michael Nowak, Tim Koglin, Laura Martin, Claudius Gros, Frontiers in neurorobotics **7**:1087

2017 **How to test for partially predictable chaos**
Hendrik Wernecke, **Bulcsú Sándor**, Claudius Gros, Scientific Reports **7**:1087

2016 **Closed-loop robots driven by short-term synaptic plasticity: Emergent explorative vs. limit-cycle locomotion**
Laura Martin, **Bulcsú Sándor**, Claudius Gros, Frontiers in Neurorobotics **10**:12

2016 **Time-scale effects on the gain-loss asymmetry in stock indices**
Bulcsú Sándor, Ingve Simonsen, Bálint Zsolt Nagy, Zoltán Néda, Physical Review E **94**(2): 022311

2015 **The sensorimotor loop as a dynamical system: How regular motion primitives may emerge from self-organized limit cycles**
Bulcsú Sándor, Tim Jahn, Laura Martin, Claudius Gros, Frontiers in Robotics and AI **2**:31

2015 **A versatile class of prototype dynamical systems for complex bifurcation cascades of limit cycles**
Bulcsú Sándor, Claudius Gros, Scientific Reports **5**: 12316

2015 **A spring-block analogy for the dynamics of stock indexes**
Bulcsú Sándor, Zoltán Néda, Physica A: Statistical Mechanics and its Applications **427**: 122-131

2013 **Chaos on the conveyor belt**
Bulcsú Sándor, Ferenc Járai-Szabó, Tamás Tél, Zoltán Néda, Phys. Rev. E **87**(4): 042920

2012 **Rms-flux relation in the optical fast variability data of BL Lacertae object S5 0716+714**
Gabriela Raluca Mocanu and **Bulcsú Sándor**, Astrophysics and Space Science, **342**(1): 147-153

2011 **Spring-block model for a single-lane highway traffic**
Ferenc Járai-Szabó, **Bulcsú Sándor** and Zoltán Néda, Central European Journal of Physics **9**(4): 1002-1009

conference proceeding

2017 **Complex activity patterns generated by short-term synaptic plasticity**
Bulcsú Sándor, Claudius Gros, ESANN 2017 Proceedings **ISBN 978-2-87587-038-4**: 317

extended abstracts

2017 **A Self-Organized One-Neuron Controller for Artificial Life on Wheels**
Claudius Gros, Laura Martin, **Bulcsú Sándor**, Proceedings of ECAL 2017 **14**: 184-185

2017 **The role of the sensorimotor loop for cognition**
Bulcsú Sándor, Laura Martin, Claudius Gros, CEUR Workshop Proceedings, EU-Cognition 2016 **1855**: 40-41

2015 **Limit cycles with transient state dynamics in cyclic networks**
Bulcsú Sándor, Claudius Gros, BMC Neuroscience **16**(Suppl 1): P89

talks

2021 **Representing and characterizing complex dynamics by state-transition networks**
Dynamics Days EU, Université Côte d'Azur, Nizza, France

2021 **A novel quantity for characterizing the dynamics of state-transition networks**
The 46th International Conference of Middle European Cooperation in Statistical Physics, Institute of Technical Physics, Riga Technical University, Online/Riga, Latvia

2021 **A novel measure for exploring the dynamics of state-transition networks**
Complex dynamical systems discussion seminar, Goethe University Frankfurt - Babes-Bolyai University - University of Bremen, Online / Cluj-Napoca, Romania - Frankfurt, Germany - Bremen, Germany

2021 **Embodied locomotion by self-organized attractor trailing**
Speaking Bodies: Embodied Cognition at the Crossroads of Philosophy, Linguistics, Psychology and Artificial Intelligence, Babes-Bolyai University, Online / Cluj-Napoca, Romania

2021 **Attractoring-based locomotion**
APS March Meeting, American Physical Society, Online

2019 **Dynamical systems approach to neural dynamics and robotics**
First Bilateral Collaboration Meeting on Neurosciences, Eötvös Loránd University, Budapest, Hungary

2019 **State-transition networks for encoding complex dynamics**
CADS Seminars, ITP, Goethe University, Frankfurt am Main, Germany

2019 **Measuring physical parameters with an Arduino**
Third German-Hungarian Bilateral Meeting on Environmental Sensing in the Physics Classroom, LMU Munich, Munich, Germany

2019 **Simple robots in physics education: deterministic laws and predictability**
GIREP-ICPE-EPEC-MPTL 2019 CONFERENCE, Budapest University of Technology and Economics, Budapest, Hungary

2019 **Interactive robots as multistable dynamical systems**
1st International Symposium on Symbiotic Intelligent Systems, University of Osaka, Osaka, Japan

2018 **Dynamical systems with multiple attractors: from design to applications**
12th Joint Conference on Mathematics and Computer Science, Universitatea Babeș-Bolyai, Cluj/Săcuieu, Romania

2017 **The Role of Attractors in the Closed-loop Scheme of Robotic Locomotion**
XXXVII Dynamics Days Europe, University of Szeged, Szeged, Hungary

2017 **A dynamical systems approach to robotics: the role of attractors in locomotion**
Seminars in Statistical Physics, ITP, Eötvös Loránd University, Budapest, Hungary

2017 **Complex activity patterns generated by short-term synaptic plasticity**
ESANN 2017, Hotel Novotel, Bruges, Belgium

2016 **Partial predictability in chaos**
Seminars in Statistical Physics, ITP, Eötvös Loránd University, Budapest, Hungary

2015 **A new prototype dynamical system with a generalised mechanical potential**
Seminars in Statistical Physics, ITP, Eötvös Loránd University, Budapest, Hungary

2014 **Dynamics of working memory**
Seminars in Statistical Physics, ITP, Eötvös Loránd University, Budapest, Hungary

2013 **Chaos on the conveyor belt**
Magyar Fizikus Vándorgyűlés, Roland Eötvös Physical Society, Debrecen, Hungary

2013 **The complex phase space of a simple mechanical system**
XXXI. OTDK FiFöMa, University of Technology and Economics, Budapest, Hungary

2013 **Time scale effects on the asymmetry of inverse statistics in stock markets**
Statistical Physics Day, Hungarian Academy of Sciences, Budapest, Hungary

posters

2020 **Attractoring: a simple framework for self-organized robotic locomotion**
Dynamics Days Digital, Vrije Universiteit Amsterdam, Amsterdam/online, online

2020 **Attractoring: a dynamical systems framework for self-organized robotic locomotion**
45rd Conference of the Middle European Cooperation in Statistical Physics (MECO45), Babes-Bolyai University, Cluj-Napoca/online, Romania

2019 **Encoding complex dynamics by state-transition networks**
44rd Conference of the Middle European Cooperation in Statistical Physics (MECO44), LMU Munich, Kloster Seeon/Munich, Germany

2018 **Designing and controlling multistable dynamical systems: from theory to applications**
43rd Conference of the Middle European Cooperation in Statistical Physics (MECO43), AGH-UST, Krakow, Poland

2018 **Embodied locomotion through self-organized frequency locking**
Analysis and Modeling of Complex Oscillatory Systems (AMCOS), PRBB Parc de Recerca Biomèdica de Barcelona, Barcelona, Spain

2016 **The role of sensori-motor loop for cognition**
EUCognition Meeting, "Cognitive Robot Architectures", TU Wien, Vienna, Austria

2016 **Short-term synaptic plasticity generates complex activity patterns of cell assemblies in Hopfield-networks**
XXXVI Dynamics Day Europe, Corfu Holiday Palace Hotel, Corfu, Greece

2016 **Complex time series of cell assemblies generated by short-term synaptic plasticity**
9th Bernstein Sparks Workshop, Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany

2016 **A new class of prototype dynamical systems for constructing multiple co-existing attractors**
Dynamics Days US 2016, Duke University, Durham, NC, USA

2015 **Limit cycles with transient state dynamics in cyclic networks**
CNS 2015, Organization for Computational Neurosciences, Prague, Chezch Republic

2015 **A prototype dynamical system with a generalized mechanical potential**
DPG 2015, Technische Universität Berlin, Berlin, Germany

2015 **Transient state dynamics arising from short-term synaptic plasticity**
OCCAM 2015, Institute of Cognitive Science, Osnabrück, Germany

2014 **Limit cycles in a ring network**
WSQSB 2014, International Centre for Theoretical Physics, Trieste, Italy

2014 **Dynamics of neural networks with transient synaptic plasticity rules**
OCCAM 2014, Institute of Cognitive Science, Osnabrück, Germany

2014 **Short-term synaptic plasticity in a ring network**
ESI-SyNC 2014, Ernst Strüngmann Institute for Neuroscience, Frankfurt am Main, Germany

2014 **Dynamics of neural networks with transient synaptic plasticity rules**
DPG 2014, Technische Universitä Dresden, Dresden, Germany

2012 **Time scale effects on the asymmetry of inverse statistics in stock markets**
TIM 12, West University, Timisoara, Romania