

Curriculum Vitae

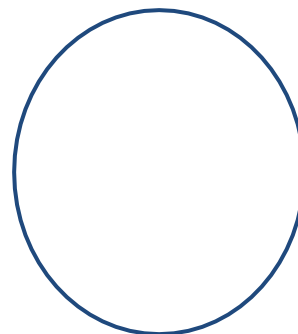
Personal Information

Family name, First name: **GERGELY ATTILA**

Nationality: Romanian

E-mail: -

Phone: -



Education

- 10.2021- Present **PhD** – Faculty of Physics, Institute for Doctoral Studies, Doctoral School of Physics, Babeş-Bolyai University, Romania
Main topic: Application of the experimental and theoretical methods of statistical physics.
- 10.2019-06.2021 **MSc** – Faculty of Physics, Babeş-Bolyai University, Romania
Specialisation: Computational Physics (average grade: 10.00/10)
- 10.2016-06.2019 **BSc** – Faculty of Physics, Babeş-Bolyai University, Romania
Specialisation: Physics (average grade: 9.27/10)

Work experience

- 03.2021-12.2023 *Assistant researcher* within research project UEFISCDI PN-III-P4-ID-PCE-2020-0647, Applications of statistical physics and thermodynamics for modelling phenomena in social and economic systems, Faculty of Physics, Babeş-Bolyai University, Romania.
- Main duties: data mining and processing, implementation and analysis of computer simulations, validating mathematical models, writing and disseminating scientific papers, project administration under the guidance of senior researchers, and the administration of computers acquired for the project.
- 08.2019-02.2020 *Physicist* at ELEKNIS SRL., Cluj Napoca, Romania.
- Main duties: Circuit design and prototyping, PCB design, microcontroller programming, operation of pick and place machines.
- 07.2018-10.2018 *Administrative Assistant* at SC Robert Bosch SRL., Juc-Herghelie, Romania.
- Main duties: collecting parts used by pick-and-place machines, registering incoming packages at the warehouse, loading components into the warehouse. I also assisted in installing a track (marked with duct tape) for a line-following robot that transported components from the logistics section to the production area (mainly to pick-and-place machines).

Job related skills

Proficient in: theoretical and computational physics with *competences in:* statistical mechanics, thermodynamics, complex systems, agent-based models, master equation framework for modeling Markov processes, Monte-Carlo numerical simulations. Further *competences include* software development and testing, data mining and data science, as well as:

- Designing and developing web applications with the [Python Django](#) framework (frontend and backend) [I am currently developing an alumni page; the current state of the project can be seen at: <http://comodi.phys.ubbcluj.ro:9085/>; this is a pet project].
- Strong knowledge and experience with [NumPy](#), [Matplotlib](#), and [CuPy](#) (NumPy-like package that uses GPU)
- Developing highly optimized numerical simulation code utilizing [NumPy](#) and [PyTorch](#) vectorization in [Python](#).
- Designing custom hardware (circuit and PCB design using [Eagle](#)) and programming embedded systems ([ESP8266](#), [ESP32](#), [ATmega328](#), [Raspberry Pi Pico](#)).
- Usage of Single-Board Computers (SBC), such as the [Raspberry Pi](#), in electronic projects.
- Developing and implementing a GNSS tracking system for high-altitude balloon trajectories, which transmits real-time positional data using [LoRa modulation](#) (with a range of hundreds of kilometers) (links: <http://comodi.phys.ubbcluj.ro:8087/high-altitude-balloon/>, <http://comodi.phys.ubbcluj.ro:8091/>).
- Developing and implementing telemetry measurement devices, such as the one described here: <http://comodi.phys.ubbcluj.ro:8087/>, which transmits environmental data (temperature, pressure, humidity, and CO₂ concentration) to an [MQTT server](#) via a mobile network.
- Utilizing software-defined radios ([RTL-SDR .V3](#), [HackRF One](#)) with [GNU Radio Companion](#) and [Gqrx](#) software.
- Designing 3D models in [SolidWorks](#) and experience with 3D printing.
- Implementing fluid dynamics simulations using finite element methods with the [FEniCS Python](#) package.

Computer and Computational Skills: Linux, Git, [Python](#), LaTeX, [SolidWorks](#), [Eagle](#), [Gqrx](#), GNU Radio, [Jupyter Notebooks](#), [Wolfram Mathematica](#), Microsoft Office, [Julia](#).

Known programming languages: advanced knowledge of [Python](#) ([NumPy](#), [PyTorch](#), [Matplotlib](#), [Django](#), [Pandas](#)), intermediate user of [C](#), [C++](#), [Wolfram Mathematica](#) and familiar with [Java](#) and [Julia](#).

Soft skills: Good organizational and time management abilities honed through diverse academic experiences. Strong communication and relationship-building skills developed through teaching and talent management program.

- Refined instructional and interpersonal skills as a Teaching Assistant at Babeş-Bolyai University, conducting seminars in Numerical Methods, Robophysics seminars, and electronics lab exercises during my doctoral program. This role significantly enhanced my communication and organizational skills.
- Enhanced teamwork, collaboration, and effective communication skills through the Talent Management Scholarship Program (Collegium Talentum Programme of Hungary). Over the past four years, attended eight professional courses each semester, focusing on efficient communication and critical soft skills, complemented by intensive training and practical application in academic settings.
- Developed proficiency in public speaking, project management, and adaptability through targeted training and practical application in academic and professional settings.
- Demonstrated ability to manage multiple responsibilities, oversee complex academic projects, and work effectively with diverse groups of students and colleagues.

Hobbies:

- Designing, programming, and building UAV aircraft and quadcopters, including autonomous guidance systems. Simulation of the guidance system can be seen here: https://www.youtube.com/watch?v=lvZH3ybbKxM&ab_channel=AttilaGergely, and a test flight can be viewed here: <https://youtube.com/shorts/XYLUHDZB90M>.
- Developing various electronic projects, including Tesla coils, lasers, long-range telemetry devices, infrared remote controls, power supplies, and GPS tracking systems.
- Applying machine learning for image processing and neural network-based inverse kinematics

- solutions (using PyTorch) [example: <https://youtu.be/whnHdsPJ9FE>].
- Swimming and hiking.

Language skills

Mother tongue: Hungarian; proficient user (C1) in Romanian and (C1) in English.

Scholarships and Awards

- 2020-present *Talent management scholarship* – offered through the Collegium Talentum Programme of Hungary (scholarship program supporting the professional development of young Hungarians and advancing their intellectual careers), administrated by the '*Fundatia Sapientia*' organisation, funded by contributions from the Bethlen Gábor State Fund.
- 2021 Special award by the Cluj-Napoca Academic Committee (KAB) for the study 'Flickering candle flames and their collective behavior' (video abstract: <https://youtu.be/0uWprnAk9o>, article: <https://www.nature.com/articles/s41598-020-78229-x>, award: <https://kab.ro/hirek/hir/dijazas-1242>).
- 2020 Special award at the 23rd Transylvanian Students Scientific Conference (ETDK) in the Physics section (oral presentation).
- 2019-2020 *Special scholarship for scientific activity* – STAR-UBB Institute, Babeş-Bolyai University, Romania
- 2019 First award at the 22nd Transylvanian Students Scientific Conference (ETDK) in the Physics section (oral presentation)

Conferences and seminars

- 21.04.2024-25.04.2024 Attila Gergely, Sándor Szakács, Ágnes Gál, Mihai Ciocîrlan, Zoltán Nédá. Long-Term Analysis of CO₂ Dynamics in a Mofette: An Observational and Modeling Approach [Poster presentation]. MECO49: 49th Conference of the Middle European Cooperation in Statistical Physics
- 22.07.2023-26.07.2023 Attila Gergely, Sándor Szakács, Ágnes Gál, Mihai Ciocîrlan, Zoltán Nédá. Fluctuations of CO₂ concentration inside a mofette long-term, high-frequency monitoring and a simple model [Poster presentation]. Sigma Phi Conference
- 22.05.2023-26.05.2023 Attila Gergely, András Kuki, Sándor Lipcsei, Dávid Antal, Zoltán Nédá. Stick-slip dynamics of a 1D Burridge-Knopoff type spring-block system on a treadmill [Poster presentation]. MECO48: 48th Conference of the Middle European Cooperation in Statistical Physics
- 29.08.2022-02.09.2022 Attila Gergely, András Kuki, Sándor Lipcsei, Zoltán Nédá. Avalanche-size statistics in a Burridge-Knopoff type spring-block model [oral presentation]. Avalanche 2022: Avalanche dynamics and precursors of catastrophic events
- 12.07.2022-16.07.2022 Attila Gergely, Bulcsú Sándor, Csaba Paizs, Robert Tötös, Zoltán Nédá. Oscillation and synchronization of diffusion flames in a hydrodynamic approach [Poster presentation]. MECO47: 47th Conference of the Middle European Cooperation in Statistical Physics

- 06.04.2021-09.04.2021 Attila Gergely, Bulcsú Sándor and Zoltán Neda. Synchronization of flickering candle flames [oral presentation]. 35th National Scientific Students' Associations Conference (OTDK), in the Physics section [oral presentation]
- 22.10.2020-25.10.2020 Attila Gergely, Bulcsú Sándor and Zoltán Neda. Experimental investigation of hydrodynamic instabilities [oral presentation]. 23rd Transylvanian Students Scientific Conference (ETDK), in the Physics section
- 14.09.2020-16.09.2020 Attila Gergely, Bulcsú Sándor and Zoltán Neda. Flickering candle flames: experiments and dynamical modelling [Poster presentation]. MECO45: 45th Conference of the Middle European Cooperation in Statistical Physics
- 23.05.2019-26.05.2019 Attila Gergely, Bulcsú Sándor and Zoltán Neda. Synchronization of flickering candle flames [oral presentation]. 22nd Transylvanian Students' Scientific Conference (ETDK), in the Physics section [oral presentation]

Publications

- 2020 Attila Gergely, Bulcsú Sándor, Csaba Paizs, Robert Tötös, Zoltán Neda. Oscillations and collective behavior in convective flows. Scientific Reports 10, 21305 (2020). <https://doi.org/10.1038/s41598-020-78229-x>
- 2021 Attila Gergely, Csaba Paizs, Robert Tötös, Zoltán Neda. Flickering candle flames and their collective behavior. Physics of Fluids 1 December 2021; 33 (12): 124104. <https://doi.org/10.1063/5.0073347>
- 2022 Attila Gergely, Zoltán Neda. Computational Fluid Dynamics Approach for Oscillating and Interacting Convective Flows. Fluids. 2022; 7 (11): 339. <https://doi.org/10.3390/fluids7110339>
- 2023 András Kuki, Sándor Lipcsei, István Gere, Ferenc Járαι-Szabó, Attila Gergely, Dávid Ugi, Péter Dusán Ispánovity, Zoltán Dankházi, István Groma, Zoltán Neda. Statistical analogies between earthquakes, micro-quakes in metals and avalanches in the 1D Burridge-Knopoff model. In Geofizika (Vol. 40, Issue 1, pp. 1–27). University of Zagreb, Faculty of Science, Department of Geophysics. <https://doi.org/10.15233/gfz.2023.40.4>
- 2024 Attila Gergely, Tamás Biró, Ferenc Járαι-Szabó, Zoltán Neda. Earthquake Avalanche Model Based on Random Jumps in Stress. Available at SSRN: <https://ssrn.com/abstract=4789507> or <http://dx.doi.org/10.2139/ssrn.4789507> (in the review process)
- 2025 Attila Gergely, lexandru Szakács, Ágnes Gál, Zoltán Neda. CO₂ Dynamics in a Mofette: Measurement and Modeling. Available at: <https://doi.org/10.3390/geosciences15090368>

2024.09.09. Cluj-Napoca, Romania

A handwritten signature in blue ink, consisting of a stylized 'H' followed by a diagonal stroke.