

József Konczer

PHYSICIST, RESEARCHER, SENIOR AI/ML RESEARCH ENGINEER.

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Summary

Physicist, Researcher, Senior AI/ML Research Engineer. I am curious about the world, and my vocation is to construct theoretical and applied tools that can empower others by capturing and formalizing the describable aspects of the Universe. I like to see things from different angles and explore connections between fields and viewpoints. I am also interested in utilizing novel or less-known approaches to enhance efficiency and make innovation possible.

I am a Theoretical Physicist by training but drifted to Machine Learning and Software Development at Wolfram Research. Through the many bends of my professional path, I always balanced industrial and academic challenges and learned to navigate both to accomplish successful innovation and research projects. Seeking truth and producing value are both a source of motivation to me.

I have many interests, and I have the ability to connect seemingly distant fields. I am eager to explore interesting, new areas and align myself with meaningful projects.

(My latest Curriculum Vitae / Résumé at all times is available on OverLeaf.)

Experience

alphaXiv

REVIEWER

US (Remote)

Oct. 2024 –

- Reading and Reviewing recent scientific papers from arXiv (mostly related to AI/ML topics),
- initiating and fostering scientific discourse on featured topics.
- Passionately supporting the mission of alphaXiv: making academia and science more open, accessible, and connected.

Engame Academy

MENTOR

Budapest, Hungary (Remote)

Sep. 2024 –

- Online mentoring and profile building for pre-university students,
- by exploring various fields, fostering a curious mindset and guiding projects.

Imagination Technologies

SENIOR RESEARCH ENGINEER

Kings Langley, UK

Apr. 2023 - Feb. 2024

- Developing hardware-conscious AI/ML algorithms,
- using techniques such as Compression and Quantization (see our poster on Self-Compressed Nano GPT).
- As a member of the AI Research team.

Wolfram Research

KERNEL DEVELOPER, CONSULTANT

Champaign, Illinois, US (Remote)

2020 - 2022

- Designing and Developing functionalities related to Game Theory:
 - Game Theory functionalities are part of Mathematica from version 14.2
 - Introducing Game Theory (Wolfram Technology Conference 2021 presentation);
 - Presenting a Demo: Language Design in Wolfram Language [Game Theory] Part 1, Part 2.
- Member of the Machine Learning Group;
- Contributions to the Wolfram Function Repository:
 - MetropolisHastingsSequence: Metropolis-Hastings Markov chain Monte Carlo;
 - RichardsonExtrapolate.

HELORO s.r.o.

RESEARCHER

Komárno, Slovakia

2020 - 2023

- Research and development in the field of Energetics;
- Intellectual Properties:
 - Utility Model: SK PUV 50018-2023, application accepted (valid from Jun. 2024),
 - Patent: SK PP 50015-2023, pending.
- Conference Publication:
 - Industrial Research and Development of Innovative Technologies for the Energy Sector.
- Popular article:
 - ATP Journal 10/2022 (in Slovak language).

Wolfram Summer School

TEACHING ASSISTANT

Online

June - July 2020

- Helping students in various computational based projects;
- Answering questions regarding Theoretical Physics and the Wolfram Physics Project.

Milestone Institute

Budapest, Hungary

MODULE LEADER

2018 - 2022

- Teaching and preparing course material for:
 - Data Science (in both Wolfram Mathematica and Jupyter Notebook). A few published final projects:
 - ★ Predicting whether a mushroom is poisonous or edible using five variables,
 - ★ Using basic attributes to predict stellar spectral classes,
 - ★ Constructing universities dataset and showing some queries examples.
 - Chaos and Order, Mechanics, Thermodynamics, PAT-ENGAA preparation.

Milestone Institute

Budapest, Hungary

MENTOR

2017 - 2020

- Mentoring, Coaching, Interdisciplinary education,
 - my experience distilled and extended in Open and Subjective Curriculum.

Institute for Particle and Nuclear Physics, Wigner RCP, HAS

Budapest, Hungary

ASSISTANT RESEARCH FELLOW

2013 - 2016

- Performing numerical simulations in integrable quantum field theories;
- Understanding AdS/CFT;
- As a member of Holographic Quantum Field Theory Research Group,
 - in Wigner Research Centre for Physics,
 - belonging to the Hungarian Academy of Sciences.
- Paper resulted from collaboration:
 - Strong coupling results in the $\text{AdS}_5/\text{CFT}_4$ correspondence from the numerical solution of the quantum spectral curve.

Jagiellonian University

Kraków, Poland

GUEST RESEARCHER

May 2015

- Gauge-string duality and its application bilateral project,
- on the Faculty of Physics, Astronomy and Applied Computer Science.
- Collaborating with Romuald A. Janik.

Tokyo Institute of Technology

Tokyo, Japan

GUEST RESEARCHER

December 2013

- Japanese-Hungarian bilateral exchange project,
- on the Department of Physics, Tokyo Institute of Technology,
- Theoretical High Energy Group / Particle Physics Group.
- Collaborating with Katsushi Ito and Yuji Satoh.

Budapest University of Technology and Economics (BME)

Budapest, Hungary

DEMONSTRATOR

2009, 2012 fall

- Teaching Physics II (electrodynamics and modern physics) for 3rd year BSc students of Faculty of Electrical Engineering and Informatics,
- as a teaching staff of Faculty of Natural Sciences.

Private Tutoring

Budapest, Hungary;

Komárno, Slovakia

TUTOR IN PHYSICS, MATHEMATICS, AND CALCULUS FOR BOTH HIGH SCHOOL AND UNIVERSITY STUDENTS

2006 - 2016

Education

Eötvös Loránd University (ELTE)

Budapest, Hungary

PHD PROGRAM IN THEORETICAL PHYSICS · DISCONTINUED

2013 - 2017

- Topic: Integrable methods in the AdS/CFT correspondence;
- Supervisor: Dr. Zoltán Bajnok;
- Principal subjects: Particle physics, Integrable (Quantum Field) theories, conformal field theories, AdS/CFT duality;
- Doctoral Pre-Degree Certificate (Absolutorium) gained in 2017.

Budapest University of Technology and Economics (BME)

Budapest, Hungary

MSc IN THEORETICAL PHYSICS · EXCELLENT WITH HIGHEST HONOURS

2010 - 2013

- Thesis: Integrable methods in gauge and string theories,
 - which has been extended to a paper:
 - Finite volume form factors in the presence of integrable defects.
- Supervisor: Dr. Zoltán Bajnok;
- Principal subjects: Statistical physics, Particle physics.

Budapest University of Technology and Economics (BME)

BSC IN PHYSICS · EXCELLENT

Budapest, Hungary

2007 - 2010

- Thesis: Fisher information in quantum mechanics;
- Supervisor: Prof. Dénes Petz;
- Principal subjects: Theoretical Physics, Quantum Information Theory, Quantum Metrology.

Selye János Gimnázium

FINAL EXAMINATION · EXCELLENT

Révkomárom (Komárno), Slovakia

1999 - 2007

Skills

Programming	Python, Wolfram Language, MATLAB, GNU Octave, \TeX , HTML, bash, C, C++
Scientific Computing	Wolfram Mathematica, PyTorch, SageMath, Google JAX, Numpy, Scipy, Scikit Learn
DevOps	Anaconda, Git, CVS, Perforce
Graphic design	Inkscape, GIMP
OS	Linux, Mac OS and Windows user skills
Languages	Hungarian (native), English (full proficiency), Slovak (proficient), Czech (intermediate)
Other skills	diving (one ★ diver since 2013 at CMAS), paragliding, waveboarding, hobby drawing, driving licence since 2008

Extracurricular Studies

The University of Queensland

INTRODUCTION TO SOCIAL PSYCHOLOGY

on edX

Online

2022

The Chinese University of Hong Kong

CLASSICS OF CHINESE HUMANITIES: GUIDED READINGS

on Coursera

Online

2021

Stanford University & The University of British Columbia

GAME THEORY II: ADVANCED APPLICATIONS

on Coursera

Online

2021

Stanford University & The University of British Columbia

GAME THEORY

on Coursera

Online

2021

Princeton University

BUDDHISM AND MODERN PSYCHOLOGY

on Coursera

Online

2016

Awards

2013	1st place , on NYIFFF physics team competition as a member of “TBA...” team	Szigliget, Hungary
2010	3rd place , on Rudolf Ortvas Competition in Physics	Correspondence Competition
2007	Bronze Medal , at the 38 th International Physics Olympiad	Isfahan, Iran
2006	Honourable Mention , at the 37 th International Physics Olympiad	Singapore

Communal Activity

Eugene Wigner College for Advanced Studies

FOUNDER AND PRESIDENT

Budapest, Hungary

2011 - 2013

- Eugene Wigner College for Advanced Studies is a Talent Nurturing and Extracurricular college associated with the Faculty of Natural Sciences of Budapest University of Technology and Economics.

Science communication

Slovakia and Hungary

SPEAKER

- Gombaszögi Nyári Tábor: Mit tud a tudomány a világról, és azt honnan tudja?: (in Hungarian language), Gombaszög, Slovakia, 2023.
 - A performed experiment has been summarized in: Chill Jegyzőkönyv (in Hungarian language).
- One week workshop titled: Reality and it's models; a guided tour into theoretical physics at S.U.N. festival, Csobánkapuszta, Hungary, 2016.

Media

Popular article

Co-AUTHOR

- ATP Journal 10/2022 (in Slovak language)

ATP Journal

2022

Blog

WRITER

Medium

2022 - PRESENT

LinkedIn, Twitter (X), Mastodon

CONTENT CREATOR

Social Media

2021 - PRESENT

Publications

2024	Non-Cooperative Games with Uncertainty , József Konczer; (See further resources on the project's GitHub repository); arXiv:2503.01889	arXiv
2024	Statistical Games , József Konczer; (Mathematical exploration of a few prototypical games in which central concepts from Statistics and Probability theory naturally emerge. See further resources on the project's GitHub repository); arXiv:2402.15892	arXiv
2023	Industrial Research and Development of Innovative Technologies for the Energy Sector , Marek Pípa, Attila Kment, František Janíček, József Konczer, Jozef Konczer, Tomáš Potásch, Ignác Havran, Botond Sánta, Lajos Csonka; 2023 23rd International Scientific Conference on Electric Power Engineering (EPE); DOI:10.1109/EPE58302.2023.10149262	Brno, Czech Republic
2016	Strong coupling results in the AdS_5/CFT_4 correspondence from the numerical solution of the quantum spectral curve , Árpád Hegedűs and József Konczer; Journal of High Energy Physics; DOI:10.1007/JHEP08(2016)061; arXiv:1604.02346	JHEP
2014	Finite volume form factors in the presence of integrable defects , Z. Bajnok, F. Bucchieri, L. Hollo, J. Konczer, G. Takacs; Nuclear Physics B; DOI:10.1016/j.nuclphysb.2014.03.010; arXiv:1312.5576	Nuclear Physics B

Memberships

2023-	AI for QFT , Artificial Intelligence meets Quantum Field Theory on Queen Mary University of London	London, UK
2013-2017	Holographic QFT Group , MTA Lendület Holographic Quantum Field Theory Group	Budapest, Hungary
2011-	Eugene Wigner College of Advanced Studies , Founder and President for two years	Budapest, Hungary
2010-2011	BME Student Body/Union , Elected Educational officer at Faculty of Natural Sciences Students' Union	Budapest, Hungary
2009-	Hungarian Nuclear Societies Young Generation Network , Organiser in 2010	Hungary

Talks and writings

Dec. 2024	Essay on uncertainty , An in-progress writing about decision-making, uncertainty, probability and statistics. The mentioned topics are discussed in a broader context, focusing on the philosophical <i>why</i> rather than the mathematical <i>how</i> . The essay is accessible on GitHub .	GitHub
Nov. 2024	Central European University , Seminar talk on Statistical Games for the Budapest Computational Neuroscience Forum at the Center for Cognitive Computation at the Central European University (CEU). See the slides on GitHub and the recording CEU's Panopto.	CEU, Budapest, Hungary
Oct. 2024	Carnegie Mellon University , Seminar talk on Statistical Games for the Group of Aaditya Ramdas (Department of Statistics and Data Science & Machine Learning Department) at Carnegie Mellon University (CMU). Slides are available on GitHub .	CMU, US, Online
Aug. 2024	Dominating mixed actions in random matrices , A draft introducing a continuous generalization of the inclusion-exclusion principle and then using the principle to calculate decision-theoretic properties of Gaussian random matrices. Accessible on GitHub . (Based on this draft a collaboration started with a mathematician from Bristol University and the results will be developed to a joint paper.)	GitHub
May 2024	Statistics Seminar at University of Bristol , Seminar talk on Statistical Games at the Statistics Seminar at University of Bristol. Slides are available on GitHub .	Bristol, UK
May 2024	Queen Mary University of London , Talk on Statistical Games on the AI for QFT seminar. See the slides on GitHub and the recording on YouTube .	QMUL, London, UK

Conferences and International Courses

2024	Stochastic Systems in Active Matter , (SSDW06), A one-day workshop on the physics and mathematics of stochastic systems in the context of active matter, supported by the Isaac Newton Institute.	Cambridge, UK
2023	Eastern European Machine Learning Summer School , (EEML2023) Presented poster: Self-Compressed Nano GPT	Košice, Slovakia
2021	Wolfram Virtual Technology Conference , (WTC-2021), Online talk given: Introducing Game Theory	Champaign, IL, US (Virtual)
2021	Eastern European Machine Learning Summer School , (EEML2021), Joined the Project Group: DeepExplain	Budapest, Hungary (Virtual)
2021	The Math(s) Fix Conference , Agenda; Talks	Online
2018	Crunch Conference , Data Engineering and Analytics as technological representative of Wolfram Research	Budapest, Hungary
2018	European Wolfram Technology Conference , promo	Oxford, UK
2016	Wolfram Summer School , (WSS16) , Project summary in a Community post: Simulating the Universe (an alternative approach)	Waltham, MA, US
2015	Young Researchers Integrability School , one-week school on Integrability	Durham, UK
2014	Summer School on String Theory and Holography , on the subject of Gauge/Gravity Duality, followed by the Mathematica Summer School on Theoretical Physics	Lisbon/Porto, Portugal
2014	Integrability in Low Dimensional Quantum Systems , as Participant and Local Organizer, Presentation given: Finite volume form factors of the defect scaling Lee-Yang model	Tihany, Hungary
2014	Finite-size Technology in Low Dimensional Quantum Systems (VII) , as Participant and Local Organizer	Budapest, Hungary
2014	Fizikus Doktoranduszok Országos Konferenciája , (DOFFI), presentation titled: Egzaktnál megoldható kvantumtérelméletek (in Hungarian language)	Balatonfenyves, Hungary
2013	Wigner 111 Scientific Symposium , Colourful & Deep	Budapest, Hungary
2013	Spring School on Superstring Theory and Related Topics , at ICTP	Trieste, Italy
2013	Mathematica School in Theoretical Physics: Advanced Topics in Conformal Field Theory , (MSSTP)	Trieste, Italy
2012	Theoretical Physics School on Quantum Gravity ,	Szeged, Hungary
2012	One week course Introduction to Symbolic Computation for Engineers , (ATHENS programme 2012) at the Technical University of Madrid	Madrid, Spain
2011	One week course On Quanta, Chaos and Daemons , (ATHENS programme 2011) at ParisTech	Paris, France
2011	Mini-Workshop on “Spin and Quantum Transport” , at Humboldt-Universität zu Berlin	Berlin, Germany
2011	PIME conference , Participating in a workshop about Communicating with young people about Nuclear Energy	Brussels, Belgium
2010	Information Geometry and its Applications III , at Universität Leipzig	Leipzig, Germany