MAKSIM ZHDANOV | Curriculum Vitae

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Research interests

- **Geometric Deep Learning**: equivariance, geometric algebra, graph neural networks.
- **Generative Modeling**: geometric latent space models, learning on non-Euclidean domains.
- **AI4Science**: physics & molecular simulations, simulation-based inference, PDE modeling.

I also find causality and its intersection with category theory quite interesting.

Education

TU DRESDEN
10/2019 - 3/2022
M.Sc. in Computer Science, GPA: 1.4.[i.e. excellent, 5-point scale]
Dresden, Germany
Thesis: Analyzing Generative Factors of Functional Connectivity with Variational Autoencoders

SAINT PETERSBURG STATE UNIVERSITY
9/2015 - 7/2019
B.Sc. in Physics, GPA: 4.8/5.0.[with honours]
Saint Petersburg, Russia
Thesis: Computer Simulations of Model Stratum Corneum Lipid Bilayers

Experience

RESEARCH ASSISTANT
04/2022 - ongoing
Helmholtz AI @ Helmholtz-Zentrum Dresden-Rossendorf
Dresden, Germany

- I am working on generative modeling approaches for experimental physics data.
- Developed a normalizing flows-based architecture for likelihood-free inference of scattering data that is orders of magnitudes faster than a baseline (arXiv page).
- Proposed a simple yet efficient way to parameterize convolutional kernels of steerable CNNs with group equivariant MLPs (arXiv page).

STUDENT ASSISTANT
09/2020 - 03/2022
Helmholtz AI @ Helmholtz-Zentrum Dresden-Rossendorf
Dresden, Germany

- Created an explainable graph neural network-based framework for automatically diagnosing EEG data (arXiv page).
- Investigated the influence of brain disorders on EEG data with causal representation learning (arXiv page).
- Participated in developing a neural network-based solver for partial differential equations and inverse problems (GitHub page).

STUDENT ASSISTANT
05/2020 - 12/2020
The Institute for Medical Informatics and Biometry, TU Dresden
Dresden, Germany

- Performed data analysis and developed statistical models of clinical treatment of leukaemia.

INTERN
07/2018 - 08/2018
Joint Institute for Nuclear Research, Laboratory of High Energies
Moscow, Russia

- I used computational modeling to develop the experimental design for studying the cellular response to light-ion beams produced by the LHEP nuclotron.

Conference proceedings

- **Zhdanov, M.**, Steinmann, S., & Hoffmann, N. (2022). Investigating Brain Connectivity with Graph Neural Networks and GNNExplainer, ICPR 2022 (Oral).

Workshop contributions

- **Zhdanov, M.**, Randolph, L., Kluge, T., Motoaki, N., Gutt, C., Ganeva, M. & Hoffmann, N. (2022). Amortized Bayesian Inference of GISAXS Data with Normalizing Flows, Machine Learning and the Physical Sciences @ NeurIPS 2022.
- **Zhdanov, M.**, Steinmann, S., & Hoffmann, N. (2022). Learning Generative Factors of EEG Data with Variational auto-encoders, Deep Generative Models workshop @ MICCAI 2022 (Oral).

Other publications & preprints

- **Zhdanov, M.**, Hoffmann, N. & Cesa, G. (2022). Implicit Neural Filters for Steerable CNNs.
- **Zhdanov, M.** (2022). Analyzing Generative Factors of Functional Connectivity with Variational Autoencoders, Master thesis.

Selected projects

- Implicit neural filters for steerable CNNs with application to point cloud data.
- Simulation-based inference for inverse scattering problems.
- Disentangled representation learning with graph VAEs for neuroimaging problems.
- Learning PDE from thermoimaging data with physics-informed NNs.

Skills

Programming language	Python | C++ | R
Frameworks & tools	Git | GROMACS | AutoDock Vina
Libraries	PyTorch | escnn | PyTorch Geometric | NumPy | Pandas
Contributed to	Neural Solvers
Languages	**Native:** Russian | **Fluent:** English | **Intermediate:** German

Community service

Machine Learning and the Physical Sciences Workshop @ NeurIPS 2022 — 09/2022
reviewer — online, USA

Symmetry and Geometry in Neural Representations Workshop @ NeurIPS 2022 — 09/2022
reviewer — online, USA

ICPR 2022 — 05/2022
reviewer — online, Canada

Extracurricular activities

GeoMedia Workshop — 11/2022
participant — Amsterdam, Netherlands

SNI 2022 Conference — 09/2022
poster presentation — Berlin, Germany

London Geometry and Machine Learning Summer School — 07/2022
poster presentation + project — online, UK

Swiss Equivariant Workshop — 07/2022
participant — Lausanne, Switzerland

MACHINE LEARNING SUMMER SCHOOL 07/2022
poster presentation Krakow, Poland

HZDR MACHINE LEARNING JOURNAL CLUB 09/2020 - ongoing
active participant Dresden, Germany

HELMHOLTZ AI CONFERENCE 06/2022
poster presentation Dresden, Germany

INTERNATIONAL AI ARCHEOLOGY CHALLENGE 04/2022
3rd place online, Israel

5. WORKSHOP BIOINFORMATICS MEETS MACHINE LEARNING 12/2021
Talk: "Investigating Brain Connectivity with Graph Neural Networks and GNNExplainer" online, Germany

MACHINE LEARNING SUMMER SCHOOL 08/2021
participant online, Taiwan

CASUS WORKSHOP 09/2021
Talk: "Investigating Brain Connectivity with Graph Neural Networks and GNNExplainer" Gorlitz, Germany

HIDA COVID-DATA CHALLENGE 04/2021
participant online, Germany