# 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 simulations, PDE modeling, physics-inspired deep learning.

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
- I am working on generative modelling 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).

### STUDENT ASSISTANT
09/2020 - 03/2022
Helmholtz AI @ Helmholtz-Zentrum Dresden-Rossendorf
- 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
- Performed data analysis and developed statistical models of clinical treatment of leukaemia.

## 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 (in progress).
- **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 (in progress).
- 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

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|---|---|
| **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

**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