

# Dmitrii Altukhov

MACHINE LEARNING SCIENTIST · PHD (COMPUTER SCIENCE)

Amsterdam, The Netherlands

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## Profile

I specialize in software engineering and data science with 8-years experience building data analysis algorithms. This involves using existing **machine learning**, **statistical analysis** and **linear algebra** techniques, as well as developing custom tools and algorithmic solutions.

Technologies: **Python**, **Docker**, **Linux**, **SQL**, occasionally **MATLAB**, **C/C++** and **Java**.

## Experience

### Artificial Intelligence Research Institute (AIRI)

Moscow, Russia

RESEARCH FELLOW

Feb. 2022 – Apr. 2023

- Built and trained deep learning model to predict speech from MEG data in **PyTorch** in a multi-GPU cloud-based setup
- Developed real-time pipeline for EEG timeseries analysis using **Python**

### Higher School of Economics, Centre for Cognition and Decision Making

Moscow, Russia

JUNIOR RESEARCH FELLOW

Feb. 2017 – Dec. 2021

- Curated and published MEG dataset for metacognition research using BIDS and OpenNeuro
- Led 4-people group developing software for real-time feature extraction and 3D visualization of brain activity from EEG in **Python**
- Sped up by a factor of 10 the beamformer inverse solver in MNE-python by modifying the algorithm for vectorized computations

### Higher School of Economics, Faculty of Computer Science

Moscow, Russia

SENIOR LECTURER

Aug. 2019 – Dec. 2021

- Developed and taught a course “**MATLAB** for data analysis” to undergraduate students

### University of Montreal, CERNEC lab.

Montreal, Canada

VISITING RESEARCHER, TEMPORARY POSITION

Oct. – Dec. 2015, May 2016 – Dec. 2016

- Built a classifier for ASD patients vs. Controls with 75% accuracy using classical ML and information geometry in **Python**
- Co-developed an open-source **Python** package for heavy neuroimaging data processing, Neuropycon, Meunier et al. [2020]

### Moscow State University for Pedagogics and Education, MEG Center

Moscow, Russia

JUNIOR RESEARCH FELLOW

Feb 2015 – Dec 2018

- Published two papers in international collaboration with the University of Montreal, see Alamian et al. [2017a,b]

### Scientific Research Institute of System Analysis

Moscow, Russia

RESEARCH ASSISTANT, PROMOTED TO JUNIOR RESEARCH FELLOW

Jun. 2011 – Jan. 2015

- Validated commercial software for simulations of flow in jet engines by comparing simulated vs. theoretical shock wave parameters

## Education

### Ph.D. in Computer Science

Moscow, Russia

HIGHER SCHOOL OF ECONOMICS, FACULTY OF COMPUTER SCIENCE

Jan. 2016 – Nov. 2021

- Thesis: “Optimal methods for functional connectivity estimation in magnetoencephalography.”
- Published a paper in a leading neuroscientific journal (see Ossadtchi et al. [2018]) by proposing a method for signal leakage suppression when measuring brain areas interaction from EEG/MEG data. Programmed the algorithm and validation scripts in **MATLAB**

### Ph.D. in Computational Fluid Dynamics (*unfinished, transferred to CS program*)

Moscow, Russia

LOMONOSOV MOSCOW STATE UNIVERSITY, DEPARTMENT OF MECHANICS AND MATHEMATICS

Sep. 2013 – Jan. 2016

- Thesis: “Numerical simulations of reactive gas flows.”

### Specialist degree in Mechanics (*Masters equivalent*)

Moscow, Russia

LOMONOSOV MOSCOW STATE UNIVERSITY, DEPARTMENT OF MECHANICS AND MATHEMATICS

Sep. 2008 – Jun. 2013

- Thesis: “Enhancement and validation of LOGOS software for simulations of the reactive fluid flows.”

## Honors & Awards

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- Selected together with other 178 people across the university for 2-year *Higher School of Economics Academic Scholarship* for publishing a paper in a high-impact journal Moscow, Russia  
2019
- Selected 1-st out of 5 teams together with 2 teammates in *IEEE Brain Data Bank Challenge* for building a competitive 2-players drinking game based on brain-computer interface St. Petersburg, Russia  
2017

## Conference contributions

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### POSTER PRESENTATIONS

- Biomag 2022** Birmingham, UK  
OVERT SPEECH DECODING FROM MEG DATA DECONTAMINATED FROM ARTICULATION ARTIFACTS 2022
- Biomag 2018** Philadelphia, USA  
OBLIQUE PROJECTION FOR PHASE SHIFT INVARIANT IMAGING OF COHERENT SOURCES 2018
- Tubingen Systems Neuroscience Symposium 2018** Tubingen, Germany  
OPTIMIZED PROJECTION FOR ZERO PHASE LAG CONNECTIVITY ESTIMATION 2018
- Biomag 2018** Philadelphia, USA  
NEUROPYCON: A PYTHON PACKAGE FOR EFFICIENT MULTI-MODAL BRAIN NETWORK ANALYSIS 2018
- 5th Workshop on Optically-Pumped Magnetometers** Freiburg, Switzerland  
OPM vs. SQUID ARRAYS IN MEG FUNCTIONAL CONNECTIVITY ESTIMATION 2017
- Biomag 2016** Seoul, South Korea  
POWER AND SHIFT INVARIANT IMAGING OF COHERENT SOURCES BY MEG DATA 2016
- Brain Connectivity Workshop 2015** San Diego, USA  
GLOBALLY-OPTIMIZED POWER AND SHIFT INVARIANT IMAGING OF COHERENT SOURCES 2015

### TALKS

- International conference “Brain-Computer Interface: Science and Practice”** Samara, Russia  
COGNIGRAPH: A REAL-TIME EEG-BASED SOURCE IMAGING SOFTWARE 2019
- Comprehensive training “MEG at McGill”** Montreal, Canada  
MEG RESTING-STATE IN AUTISM. APPROACH TO ANALYSIS. 2015

## Publications

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- Dmitrii Altukhov, Daria Kleeva, and Alexei Ossadtchi. PSIICOS projection optimality for EEG and MEG based functional coupling detection. *BioRxiv*, 2023
- V. Manyukhina et al. Globally elevated excitation–inhibition ratio in children with autism spectrum disorder and below-average intelligence. *Molecular Autism*, 2022
- B. Martín-Luengo et al. Retrospective confidence judgements in general-knowledge questions. *PsyArXiv*, 2021
- D. Meunier et al. NeuroPycon: An open-source python toolbox for fast multi-modal and reproducible brain connectivity pipelines. *NeuroImage*, 2020
- E. Combrisson et al. Visbrain: A multi-purpose GPU-accelerated open-source suite for multimodal brain data visualization. *Frontiers in Neuroinformatics*, 13, 2019
- A. Ossadtchi, D. Altukhov, and K. Jerbi. Phase shift invariant imaging of coherent sources (PSIICOS) from MEG data. *NeuroImage*, 183, 2018
- Z. Yapple et al. Power of feedback-induced beta oscillations reflect omission of rewards: evidence from an EEG gambling study. *Frontiers in Neuroscience*, 12, 2018
- G. Alamian et al. Measuring alterations in oscillatory brain networks in schizophrenia with resting-state MEG: State-of-the-art and methodological challenges. *Clinical Neurophysiology*, 128(9), 2017b
- N. Smirnov et al. Supercomputer simulations of detonation of hydrogen-air mixtures. *International Journal of Hydrogen Energy*, 2015a
- N. Smirnov et al. Accumulation of errors in numerical simulations of chemically reacting gas dynamics. *Acta Astronautica*, 2015b
- V. Betelin et al. Supercomputer modeling of hydrogen combustion in rocket engines. *Acta Astronautica*, 2012