

Nina KUDRYASHOVA

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Based in: Edinburgh, UK

Research interests computational neuroscience, machine learning, information theory, theoretical biology

Work experience **University of Edinburgh** Edinburgh, UK
Research Associate in the School of Informatics 2021 – Present
Working on latent space identifiability for non-autonomous latent dynamics models with Dr Matthias Hennig: demixing movement plans from online error corrections in neural responses in motor areas of animals performing reaching movements. My current model (Ctrl-TNDM/BAND) achieved the highest performance in behavior reconstruction on the [Neural Latents Benchmark](#).

Postdoctoral Researcher at the Centre for Discovery Brain Sciences 2022 – 2023
Laboratory of Prof Nathalie Rochefort. I analysed large-scale neuronal recordings in mice to:

- Reveal communication between multiple simultaneously recorded brain areas and identify the information that was being communicated.
- Compare attention to movie presentation in neurotypical and autism spectrum disorder mouse models.
- Decode the imaginary location of the mouse navigating in a familiar environment in the dark.

Research Associate in the School of Informatics 2019 – 2022
Developed Copula-GP package for modelling neural populations. Analysed calcium imaging and Neuropixels population recordings in collaboration with experimental groups in Centre for Discovery Brain Sciences (with the labs of Prof. Rochefort (primarily), Prof. Duguid and Prof. Nolan).

LUMC, Cardiology department Leiden, The Netherlands
Visiting researcher (short-term) Sept 2018 – Feb 2019
Developed a CNN-based denoiser and arrhythmia detector for experimental setup. Created a simulation-based data augmentation pipeline for arrhythmia video recordings. Produced a demo of a computer vision algorithm for arrhythmia detection for a successful ERC grant application.

Education **Ghent University & MIPT** Ghent, Belgium & Moscow, Russia
Joint PhD in Biophysics; Mentors: Prof. A. Panfilov and Prof. K. Agladze. 2015 – 2018
Moscow Institute of Physics and Technology (MIPT) Moscow, Russia
MSc. Applied Physics and Mathematics with honors 2013 – 2015
Mentors: Prof. A. Panfilov and Prof. K. Agladze. GPA: 9.44/10; Ranking: top 2%: 41/1892;
Moscow Institute of Physics and Technology (MIPT) Moscow, Russia
BSc. Applied Physics and Mathematics with honors 2009 – 2013
Mentor: Prof. K. Agladze. GPA: 4.96/5

Teaching **Mentor for 3 groups at Neuromatch Academy: Computational neuroscience** Summer 2023
Teaching assistant at the Computational Neuroscience Imbizo (South Africa) 2022 – 2024
Worked as one of the 6 TAs at the summer school aimed at promoting the diversity in neuroscience and connecting African students with the international scientific community. Developed and delivered half-day tutorials on dynamical systems (2022) and on dimensionality reduction (PCA) and neural population models (2023); supervised course projects.
Tutor in Machine Learning and Pattern Recognition (University of Edinburgh) Fall 2021
Tutorial reviewer (Neuromatch Academy: Deep Learning course) Summer 2021
Teaching Assistant (Neuromatch Academy: Computational neuroscience) Summer 2020
Led a group of 10 students (Pod 120: Nano Agouti)
Tutorial creator (electrophysiological models of neurons) 2017

Honors and scholarships

Newton International Fellowship (Royal Society; awarded but declined)	2019
Vladimir Potanin Fellowship Program for potential leaders	2009 – 2015
Silver medal at 40th International Physics Olympiad (IPhO)	2009

Service and outreach

Leiden City of Science 2022	August 2022
Participated with an artwork “Lost in the Cells”	
Building population models for large-scale neural recordings	June 2022
Workshop co-organiser, chairwoman, speaker	
Neurons & Systems Journal Club (University of Edinburgh)	2020 – 2022
Responsible for scheduling, communication, giving advice on selecting papers for students.	
“The Art of Theoretical Biology” (Springer, Heidelberg)	April 2020
Contributed two artworks: “Lost in the Cells” and “Heart cells are aMAZEing”	
International Physics Olympiad (IPhO)	December 2020
Jury member, responsible for problem formulation, marking and moderation.	

Publications

- [1] **Kudryashova N**, Greene R, Hurwitz C, Hennig M (2023). Weak behavior supervision for latent dynamics is all you need. *Bernstein Conference 2023*.
- [2] **Kudryashova N**, Perich M, Miller L, Hennig M (2023). Ctrl-TNDM: Decoding feedback-driven movement corrections from motor cortex neurons. *COSYNE 2023*.
- [3] **Kudryashova N**, Amvrosiadis T, Dupuy N, Rochefort N, Onken A (2022). Parametric Copula-GP model for analyzing multidimensional neuronal and behavioral relationships. *PLoS computational biology: Methods*.
- [4] Hurwitz C, **Kudryashova N**, Onken A, Hennig MH. (2021). Building population models for large-scale neural recordings: opportunities and pitfalls. *Current Opinion in Neurobiology*.
- [5] **Kudryashova N**, Amvrosiadis T, Dupuy N, Rochefort N, Onken A (2021). Behavioral modulation of information processing in visual cortex analysed with Copula-GP model. *COSYNE-2021*
- [6] Majumder R, De Coster T, **Kudryashova N**, et al. (2020). Self-restoration of cardiac excitation rhythm by anti-arrhythmic ion channel gating. *Elife*.
- [7] **Kudryashova N**, Amvrosiadis T, Dupuy N, Rochefort N, Onken A (2020). Copula-GP method for conditioning on behavioral and contextual variables reveals navigation task structure. *Bernstein 2020*
- [8] **Kudryashova N**, Amvrosiadis T, Dupuy N, Rochefort N, Onken A (2020). Parametric Copula-GP model reveals tuning of neuronal and behavioral relationships to visual stimuli. *COSYNE-2020*
- [9] **Kudryashova N**, Amvrosiadis Th, Dupuy N, Rochefort N, Onken A. (2019). Parametric copula models reveal neuronal and behavioral time-dependent relationships in primary visual cortex. *Bernstein Conference*
- [10] **Kudryashova N**, Nizamieva A, Tsvelaya V, Panfilov AV, Agladze KI. (2019). Self-organization of conducting pathways explains electrical wave propagation in cardiac tissues with high fraction of non-conducting cells. *PLoS computational biology*.
- [11] Zhirnov AA, **Kudryashova NN**, et al. (2019). Spores of puffball fungus *Lycoperdon pyriforme* as a reference standard of stable monodisperse aerosol for calibration of optical instruments. *PloS ONE*.
- [12] Tsvelaya VA, Kalita IYE, Krashenninnikova AV, Doronin RA, **Kudryashova NN**, Agladze KI. (2018). Cardiac excitation waves under strong hyperkalemia condition. *JETP Letters*.
- [13] Podgurskaya AD, Tsvelaya VA, Frolova SR, Kalita IY, **Kudryashova NN**, Agladze KI. (2018) Effect of heptanol and ethanol on excitation wave propagation in a neonatal rat ventricular myocyte monolayer. *Toxicology in Vitro*.
- [14] **Kudryashova N**, Tsvelaya V, Agladze K, Panfilov A. (2017) Virtual cardiac monolayers for electrical wave propagation. *Scientific Reports*.
- [15] Kachalov VN, Tsvelaya VA, **Kudryashova NN**, Agladze KI. (2017) Success of spiral wave unpinning from the heterogeneity in a cardiac tissue depends on its boundary conditions. *JETP Letters*.
- [16] Kachalov VN, **Kudryashova NN**, Agladze KI. (2016) Spontaneous spiral wave breakup caused by pinning to the tissue defect. *JETP letters*.
- [17] **Kudryashova NN**, Teplenin AS, Orlova YV, Agladze KI. (2015) Excitation wave propagation in a patterned multi-domain cardiac tissue. *JETP Letters*.
- [18] **Kudryashova NN**, Kazbanov IV, Panfilov AV, Agladze KI. (2015) Conditions for waveblock due to anisotropy in a model of human ventricular tissue. *PLoS ONE*.
- [19] **Kudryashova NN**, Teplenin AS, Orlova YV, Selina LV, Agladze K. (2014) Arrhythmogenic role of the border between two areas of cardiac cells alignment. *Journal of Molecular and Cellular Cardiology*.