Tomáš Bárta

PhD candidate · Computational Neuroscience

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Education

Charles University and Sorbonne University *Prague / Paris*

PhD Computational Neuroscience *2018 - present*

- under double supervision
- Advisors:
  - Lubomir Kostal, Institute of Physiology, Czech Academy of Sciences
  - Philippe Lucas, Institute of Ecology and Environmental Sciences Paris, INRAE

Charles University *Prague*

MSc., Mathematical and computational modelling in physics *2016 - 2018*

- Advisor: Lubomir Kostal
- graduated *summa cum laude*

Charles University *Prague*

BSc., General physics *2012 - 2016*

Work Experience

Datatree s.r.o. *Prague*

Data Scientist *2015 - 2018*

- part time job (20h / week)
- analyzing banking transactional data using heuristic and machine learning approaches

Publications

Published

Barta, T, Kostal L. 2021. Regular spiking in high conductance states: The essential role of inhibition. *Physical Review E*, **103**, 022408.

Barta, T, Kostal L. 2019. The effect of inhibition on rate code efficiency indicators. *PLoS Computational Biology*, **15**, e1007545.

Svanda, M, Sobotka, M, Barta, T. 2014. Moat flow system around sunspot subsurface layers. *The Astrophysical Journal*, **790**, 2.

Preprints

Barta, T, Montsempès, C, Demondion, E, Chatterjee, A, Kostal, L, Lucas, P. Stimulus duration encoding occurs early in the moth olfactory pathway. *bioRxiv*

Presentations and posters

Barta, T, Kostal, L. 2022. Excitation-inhibition coupling in recurrent neural networks promotes energy-efficient information transmission. Poster: Bernstein Conference 2022, Berlin.

Barta, T, Kostal, L. 2022. Maximally informative coupling in a balanced excitatory-inhibitory neuronal network. Talk: CNS*2022, Information theory workshop, Melbourne.

Barta, T, Kostal, L. 2022. Spike frequency adaptation mechanism leading to variability quenching in recurrent neural networks. Poster: CNS*2022, Melbourne.

Barta, T, Monsempès, C, Demondion, E, Chatterjee, A, Kostal, L, Lucas, P. 2022. Stimulus duration encoding by moth olfactory receptor neurons. Poster: FENS Forum 2022.

Barta, T, Kostal L. 2021. Information-metabolically optimal E-I balance in a network of heterogeneous neurons. Online poster: Bernstein Conference 2021.

Barta, T, Kostal L. 2021. Inhibitory noise decreases membrane potential fluctuations and may lead to increased firing regularity. Online talk: Neural Coding 2021.

Barta, T, Kostal L. 2021. Inhibitory input may increase firing regularity despite higher synaptic noise. Online poster: CNS*2021.

Barta, T, Kostal L. 2021. Precise spike-timing can be achieved by increasing inhibitory input. Flash talk: International Conference on Mathematical Neurosciences.

Barta, T, Monsempès, C, Demondion, E, Kostal, L, Lucas, P. 2021. Triphasic response of the moth olfactory receptor neurons. Online talk: Young Researchers in Life Sciences Conference.

Barta, T, Kostal L. 2020. Inhibition enhances spike firing regularity. Online poster: Bernstein Conference 2020.

Grants and awards

GA UK (Charles University Grant Agency). 2020-2022: Neural coding and metabolic cost of information processing

FENS-IBRO/PERC Travel Grant for the FENS Forum 2022

Outreach, Teaching and Peer Review

Outreach & Teaching

2021, Code in Place, Section Leader. Volunteer member of the teaching team of an online Python programming course offered by Stanford University.

2019, Science To Go. Outreach talk to the general public, introducing how mathematics are applied in neurosciences.

2012-2015, FYKOS, Event Organizer. Main organizer of Physics Brawl, competition for high school students.

Peer Review

Scientific Reports
IEEE Transactions on Molecular, Biological, and Multi-Scale Communications
Neural Processing Letters
Cognitive Neurodynamics