

Lubomir Kostal

Address	Laboratory of Computational Neuroscience Institute of Physiology, CAS Videnska 1083 142 00 Prague 4 Czech Republic	Phone	+420 2 4106 2276
		Email	kostal@biomed.cas.cz
		WWW	www.biomed.cas.cz/~kostal (see for full <i>academic CV</i>)
		LinkedIn	www.linkedin.com/in/lubomir-kostal

Executive Summary

- I have two decades of experience in mathematical modeling, data analysis and Linux system administration.
- As a researcher I focus on the applications of statistics, stochastic point process theory, information and estimation theory to neural systems, bio-inspired computing and NeuroAI.
- I lead and supervise an international research team (~6 people including students and postdoctoral fellows) at the Czech Academy of Sciences since 2014.
- I am responsible for managing the budget and the formation of the team, proposing externally-funded grant projects and arranging international collaborations.
- I regularly present the research results at universities abroad and at international conferences (10+ invited scientific talks in last 10 years, expenses covered by the inviting party).

Skills

- Strong mathematical background: probability, stochastic processes, estimation and information theory.
- Programming, data analysis and visualisation: R, Wolfram Math., C, Python, scripting languages, Fortran.
- Research leadership and team management: publications, grants, outreach (see also the *academic CV*).
- Languages: Czech (*native*), English (*full professional proficiency*), German (*limited working proficiency*).

Experience

2014– Independent research group leader: Lab. of Computational Neuroscience, Institute of Physiology
2011–2013 Associated scientist, Institute of Physiology
2005–2010 Doctoral and Postdoc stay: Laboratory of Prof. Jean-Pierre Rospars, INRA, Versailles, France
2004–2007 PhD student (supervisor: prof. Petr Lansky, Institute of Physiology, CAS)
2000–2005 Freelance: Programmer; Linux System Administrator; English Translator

Education

2007 PhD (biophysics), Charles University Prague and Institute of Physiology,
 Thesis: "Principles of information processing in neuronal models".
2003 MSc (physics), Faculty of Mathematics and Physics, Charles University Prague.

Awards

- Prize for the best paper of the year (Institute of Physiology, CAS): awarded in 2017 (Rajdl K, Lansky P, Kostal L (2017) *Neural Netw.*, 95, 57–65) and in 2011 (Kostal L, Lansky P Pokora O (2011) *PLoS ONE*, 6, e21998).
- 2012: *Otto Wichterle Award*: Prestigious award given by the Czech Academy of Sciences to young researchers for achieving exceptional results in the given area of science.
- 2010: Best poster presentation award (Kostal L: "Information capacity in the weak-signal approximation"), *Neural Coding 2010*, Limassol, Cyprus.
- 1997: *Students' Professional Activities (SPA)*: Winner of the nation-wide high-school student competition in Physics with the thesis: "Numerical solution of the geodesic equation in general relativity for the extreme Schwarzschild-de Sitter metric" (supervisor: Prof. J. Podolsky, Faculty of Mathematics and Physics, Charles University Prague).

Research project management (5 most important grants, principal investigator)

- 2020–2022: *Optimality of neuronal communication: an information-theoretic perspective*, The Czech Science Foundation (GACR), (\approx 261.000 EUR)
- 2017–2019: *Neural coding precision and its adaptation to the stimulus statistics*, The Czech Science Foundation (GACR) (\approx 217.000 EUR)
- 2015–2017: *Efficiency of information transfer and the role of energetic constraints in neuronal systems*, The Czech Science Foundation (GACR) (\approx 259.000 EUR)
- 2012–2014: *Information-theoretic analysis of stimulus coding in sensory neurons*, The Czech Science Foundation (GACR) (\approx 56.000 EUR)
- 2011–2013: *Neural Coding and Information beyond Shannon*, European Office of Aerospace Research and Development, Office of Naval Research Global (support for the respective workshops in 2012 and 2013, \approx 20.000 EUR)

Selected scientific publications (corresponding or main author)

- Barta, T. & Kostal, L. (2024) Shared input and recurrency in neural networks for metabolically efficient information transmission. *PLoS Comput. Biol.*, **20**, e1011896.
- Rajdl, K. & Kostal, L. (2023) Estimation of the instantaneous spike train variability. *Chaos Solit. Fractals*, **177**, 114280.
- Kostal, L. & Kobayashi, R. (2019) Critical size of neural population for reliable information transmission. *Phys. Rev. E (Rapid Commun.)*, **100**, 050401(R).
- Rajdl, K., Lansky, P. & Kostal, L. (2017) Entropy factor for randomness quantification in neuronal data. *Neural Netw.*, **95**, 57–65.
- Kostal, L. (2016) Stimulus reference frame and neural coding precision. *J. Math. Psychol.*, **71**, 22–27.
- Kostal, L., Lansky, P. & Pilarski, S. (2015) Performance breakdown in optimal stimulus decoding. *J. Neural Eng.*, **12**, 036012.
- Kostal, L., Lansky, P. & Pokora, O. (2013) Measures of statistical dispersion based on Shannon and Fisher information concepts. *Inform. Sciences*, **235**, 214–223.
- Kostal, L. (2010) Information capacity in the weak-signal approximation. *Phys. Rev. E*, **82**, 026115.

Total: 41 papers in IF journals, 3 in peer-reviewed proceedings, 2 editorials
Google Scholar: 676 citations, *h*-index: 16

Outreach

■ Professional service

- Organizer of international conferences in Prague: Neural Coding (2012, \sim 100 participants), Information beyond Shannon (2013, \sim 20p), Inform. Theory in Computational Neurosciences (2015, \sim 100p)
- Technical and program committee member: ESSAN (European Symposium on Artificial Neural Networks) and ICMNS (International Conference on Mathematical NeuroScience)
- Editorial board of scientific journals: *Neural Proc. Lett.* since 2016; guest editor (2016, 2018) for *BioSystems* and *Math. Biosci. Eng.*
- Reviewer for 20+ scientific journals (including *Neural Netw.*, *Phys Rev E*, *Plos Comput. Biol.*)

■ Popularization of science

- Interviews for several Czech Radio stations and newspapers in 2008, 2012
- Czech TV interview (Otto Wichterle prize reception); Neural Coding 2012 conference coverage
- Lectures for general public: Brain Awareness Week (2018); Public library in Nymburk (2022).

■ Educational collaboration

- Initiated (jointly with Dr. R. Kobayashi) the *Memorandum of Understanding* between the *Institute of Physiology of the Czech Academy of Sciences, Czech Republic*, and the *National Institute of Informatics, Japan*, in the area of research and education in the fields of artificial intelligence and computational neuroscience (signed by the directors in 2016)