



Bálint KIRÁLY

Curriculum Vitae

BASIC INFORMATION

DATE OF BIRTH: 09/01/1994
PLACE OF BIRTH: Budapest, Hungary
NATIONALITY: Hungarian

WORK EXPERIENCE

2026–	RESEARCH FELLOW, Division of Neurophysiology, Medical University of Vienna
2025	EMBO POSTDOCTORAL FELLOW, Institute of Artificial Intelligence, Medical University of Vienna
2024	RESEARCH FELLOW, Lendület Laboratory of Systems Neuroscience, Institute of Experimental Medicine
2018–2023	ASSISTANT RESEARCH FELLOW, Lendület Laboratory of Systems Neuroscience, Institute of Experimental Medicine, Hungarian Academy of Sciences
2016–2020	ASSISTANT RESEARCH FELLOW, Department of Biophysics and Radiation Biology, Semmelweis University
2016–2018	TEACHING ASSISTANT, Institute of Nuclear Techniques, Budapest University of Technology and Economics
2015–2017	TEACHING ASSOCIATE, Institute of Physics, Budapest University of Technology and Economics

EDUCATION

2018–2023	PHD IN BIOLOGICAL PHYSICS, Eötvös Loránd University (Summa Cum Laude) Thesis title: Examination of the Deep Brain Modulation of Hippocampal Oscillations Supervisor: Balázs Hangya
2016–2018	MS IN PHYSICS, Budapest University of Technology and Economics Specialization in Medical Physics (Excellent) Thesis title: Developing methods to simultaneously study the cholinergic and dopaminergic systems
2013–2016	BS IN PHYSICS, Budapest University of Technology and Economics (Excellent)

TEACHING ACTIVITES

2015–2018	Seminars on basic and modern physics for physicists, biological engineers and electrical engineers.
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SUPERVISED STUDENTS

2021–2025	Annamária Benke (Eszterházy Károly Catholic University, biologist)
2023–2024	Johanna Bíró (Pázmány Péter Catholic University, molecular biology)
2023–2024	Malek Aouadi (Pázmány Péter Catholic University, medical biotechnology)
2021–2024	Márton Kajtor (Széchenyi István University, food engineer)
2021–2024	Franciska Benyó (Semmelweis University, MD)
2018–2024	Viven Pillár (Eötvös Loránd University, biologist)
2019	Eszter Kokas (Semmelweis University, MD)
2019	Weihao Sheng (Visiting student – ShanghaiTech Universtiy, biologist)

LANGUAGES

ENGLISH	Proficient (C1)
GERMAN	Conversational (B2)
HUNGARIAN	Native

AWARDS

2025	EMBO Fellowship
2023	HUN-REN KOKI Publication Award
2023	FRM travel Grant (FENS Regional Meeting, Algarve)
2022	Stephen W. Kuffler Scholarship
2021	New National Excellence Programme of the Hungarian Ministry of Innovation and Technology
2020	New National Excellence Programme of the Hungarian Ministry of Innovation and Technology
2020	FENS - IBRO/PERC Conference Grant (FENS 2020 Virtual Meeting)
2019	New National Excellence Programme of the Hungarian Ministry of Innovation and Technology
2019	Undergraduate students national competition in medical and biophysics – Third prize
2019	FRM Travel Grant (FENS Regional Meeting, Belgrade)
2018	Excellent Student Award of the Budapest University of Technology and Economics
2018	Scientific scholarship of the Budapest University of Technology and Economics
2018	Undergraduate students scientific competition in neuroscience at the Semmelweis University – First prize
2017	Scientific scholarship of the Budapest University of Technology and Economics
2017	Undergraduate students scientific competition in medical physics at the Budapest University of Technology and Economics
	First prize and special award for the best presentation

MEMBERSHIP IN SCIENTIFIC SOCIETIES

2026–	Austrian Neuroscience Association (ANN)
2024–	Hungarian Academy of Sciences (MTA), public body member
2024–	Society for Neuroscience (SfN)
2018–	Federation of European Neuroscience Societies (FENS)
2018–2025	Hungarian Neuroscience Society (MITT)

PUBLICATIONS

Journal Articles

14. **B. Király***, V. Pillár, Í. Szabó, D. Schlingloff, K. Szigeti, Y. Li, B. Hangya, Cholinergic — dopaminergic interplay underlies prediction error broadcasting. *bioRxiv* (2026)
13. **B. Király***, E. Császár*, D. Balázsfi, K. Sviatkó, C-H. Belval, Á. Dénes, B. Hangya, Microglia modulate information processing in the mouse barrel cortex. *Journal of Neuroscience* (2026); *equal contribution
12. J. Szabó, P. Hegedüs, T. Laszlovszky, L. Halász, G. Miklós, **B. Király**, Gy. Perczel, V. Bokodi, L. Entz, I. Ulbert, G. Tamás, D. Fabó, L. Erőss, B. Hangya, Neurons of the human subthalamic nucleus engage with local delta frequency processes during action cancellation. *Nature Communications* (2026)
11. D. Schlingloff, Í. Szabó, É. Gulyás, **B. Király**, R. Kispál, M. Stephenson-Jones, B. Hangya, Most ventral pallidal cholinergic neurons are cortically projecting bursting basal forebrain cholinergic neurons. *Journal of Neuroscience* (2026)
10. M. Kajtor, V. Billes, **B. Király**, H. Stabb, K. Sviatkó, E. Újvári, D. Balázsfi, S. Seidenbecher, D. Kvitisiani, T. Vellai, B. Hangya, Altered reactivity to threatening stimuli in Drosophila models of Parkinson's disease, revealed by a trial-based assay. *eLife* (2025)
9. A. Jász, L. Bíró, Zs. Buday, **B. Király**, O. Szalárdy, K. Horváth, G. Komlósi, R. Bódizs, K.J. Kovács, M. A. Diana, B. Hangya, L. Acsády, Cell type-specific control of acute stress disorder via the paraventricular nucleus of the thalamus. *PLOS Biology* (2025)
8. P. Hegedüs*, **B. Király***, D. Schlingloff*, V. Lyakhova, A. Velencei, Í. Szabó, M. I. Mayer, Zs. Zelenak, G. Nyíri, B. Hangya, Parvalbumin-expressing basal forebrain neurons mediate learning from negative experience. *Nature Communications* (2024); *equal contribution
7. **B. Király**, A. Domonkos, M. Jelitai, V. Lopes-dos-Santos, S. Martínez-Bellver, B. Kocsis, D. Schlingloff, A. Joshi, M. Salib, R. Fiath, P. Bartho, I. Ulbert, T. F. Freund, T. Viney, D. Dupret, V. Varga, B. Hangya, The medial septum controls hippocampal supra-theta oscillations. *Nature Communications* (2023)
6. P. Hegedüs, K. Sviatkó, **B. Király**, S. Martínez-Bellver, B. Hangya, Cholinergic activity reflects reward expectations and predicts behavioral responses. *iScience* (2022)
5. **B. Király** and B. Hangya, Navigating the statistical minefield of model selection and clustering in neuroscience. *eNeuro* (2022)
4. **B. Király**, D. Balázsfi, I. Horváth, N. Solari, K. Sviatkó, K. Lengyel, E. Birtalan, M. Babos, G. Bagaméry, D. Máthé, K. Szigeti, B. Hangya, In Vivo Localization of Chronically Implanted Electrodes and Optic Fibers in Mice. *Nature Communications* (2020)
3. N. Tőkési, E. Kozák, K. Fülöp, D. Dedinszki, N. Hegedüs, **B. Király**, K. Szigeti, K. Ajtay, Z. Jakus, J. Zaworski, E. Letavernier, V. Pomozi, A. Váradi, Pyrophosphate therapy prevents trauma-induced calcification in the mouse model of neurogenic heterotopic ossification. *Journal of Cellular and Molecular Medicine* (2020)
2. **B. Király**, B. Hangya, Cartographers of the Cognitive Map: Locus Coeruleus Is Part of the Guild. *Neuron* (2020)

1. L. Király, **B. Király**, K. Szigeti, Cs. Zs. Tamás, S Darányi, Virtual museum of congenital heart defects: digitization and establishment of a database for cardiac specimens. *Quantitative imaging in medicine and surgery* (2019)

Invited talks

- 2024 Seminar of the Institute of Artificial Intelligence, Medical University of Vienna, Austria
Neuromodulator-mediated mechanisms of learning in dynamic environments
- 2024 Cognition, Systems, Motion, Oscillation (CoSMOs) Conference, Kladovo, Serbia
Correlations in neuromodulatory codes during associative learning
- 2023 Researchers' Night, Budapest, Hungary
Memory Multiplex
- 2022 Semmelweis IWG Seminar, Budapest, Hungary
Basal forebrain modulation of learning and memory
- 2022 KOKI Days – Conference in Neuroscience, Várbesztes, Hungary
Correlations in neuromodulatory signals during associative learning
- 2022 Cognition, Systems, Motion, Oscillation (CoSMOs) Conference, Prague, Czech Republic
The medial septum controls hippocampal oscillations beyond the theta rhythm
- 2022 ELTE ÚNKP Conference, online
Comparative study of the role of neuromodulatory systems in learning
- 2021 ELTE ÚNKP Conference, online
Examining complex brain systems
- 2020 ELTE ÚNKP Conference, online
Simultaneous electrophysiological examination of multiple brain areas
- 2020 Go2uni Summer School, Budapest, Hungary
Modern Neuroimaging Techniques
- 2019 System Neuroscience and Decision Making – SYNDI conference, Aarhus, Denmark
The simultaneous study of the cholinergic and dopaminergic systems in associative learning
- 2019 FENS Regional Meeting, Belgrade, Serbia
In vivo localization of deep brain implants in mouse
- 2019 3rd Hungarian Neuroscience Doctoral Conference, Debrecen, Hungary
The simultaneous study of the cholinergic and dopaminergic systems in associative learning
- 2018 IEM HAS Student Seminar, Budapest, Hungary
In vivo localization of deep brain electrodes in mouse neurophysiology experiments

Conferences

- 2025 AITHYRA Symposium, Vienna, Austria
2025 COSYNE conference, Montreal, Canada
2024 SfN meeting, Chicago, USA
Correlations in neuromodulatory codes during different learning processes
2024 FENS meeting, Vienna, Austria
Correlations in neuromodulatory codes during different learning processes
2024 International Neuroscience Conference, Pécs, Hungary
2023 SciComp23, Budapest, Hungary
The medial septum modulates hippocampal oscillations beyond the theta rhythm
2023 KOKI Days – Conference in Neuroscience, Várbesztes, Hungary
2023 The 2nd CJK International Meeting, Zhuhai, China
The medial septum modulates hippocampal oscillations beyond the theta rhythm
2023 NAP 3.0 Conference, Tihany, Hungary
The medial septum modulates hippocampal oscillations beyond the theta rhythm
2023 FENS Regional Meeting, Algarve, Portugal
The role of neuromodulatory systems in implicit learning
2023 Joint Meeting of the Hungarian and the Austrian Neuroscience Associations, Budapest, Hungary
The role of neuromodulatory systems in implicit learning
2022 KOKI Days – Conference in Neuroscience, Várbesztes, Hungary
The medial septum modulates hippocampal oscillations beyond the theta rhythm
2022 FENS meeting, Paris, France
The medial septum modulates hippocampal oscillations beyond the theta rhythm
2022 International Neuroscience Meeting – IBRO Workshop, Budapest, Hungary
Simultaneous examination of neuromodulatory systems with fiber photometry & electrophysiology
2020 FENS Virtual Meeting
Cholinergic and dopaminergic prediction error coding in associative learning
2020 Annual Conference of the Hungarian Neuroscience Society, Szeged, Hungary
Cholinergic and dopaminergic prediction error coding in associative learning
2020 4th Hungarian Neuroscience Doctoral Conference, Szeged, Hungary
Hippocampal theta nested spectral components are represented in the medial septum
2019 KOKI Days – Conference in Neuroscience, Várbesztes, Hungary
The simultaneous study of the cholinergic and dopaminergic systems in associative learning
2019 FENS Regional Meeting, Belgrade, Serbia
In vivo localization of deep brain implants in mouse
2019 Annual Conference of the Hungarian Neuroscience Society, Debrecen, Hungary
2018 KOKI Days – Conference in Neuroscience, Várbesztes, Hungary
In vivo localization of deep brain electrodes in mouse neurophysiology experiments
2018 Frigyes Korányi Science Forum, Budapest, Hungary
In vivo localization of deep brain electrodes in mouse neurophysiology experiments
2017 KOKI Days – Conference in Neuroscience, Balatonfüred, Hungary
Cholinergic activity in a classic sustained attention task
2017 System Neuroscience and Decision Making – SYNDI conference, Rádpuszta, Hungary
2016 European Society for Magnetic Resonance in Medicine and Biology –
33rd Annual Scientific Meeting, Vienna, Austria

(Co-)REVIEWING

Neuron, Nature Neuroscience, Nature Reviews Neuroscience, Nature Communications, Communications Biology, PLOS Computational Biology, Journal of Neuroscience, European Journal of Neuroscience, Frontiers in Neural Circuits