Jorge Ramírez-Ruiz, PhD

Postdoctoral researcher
Département de Neurosciences
Université de Montréal, Canada

jorgeerrz@gmail.com
jorge.eduardo.ramirez.ruiz@umontreal.ca
http://jorgeerrz.github.io

Education

2018 - 2023 **PhD in Neuroscience,** Mentor: Dr. Rubén Moreno-Bote.
Honors: *cum laude*.
Universitat Pompeu Fabra (UPF), Barcelona, Spain.

2016 – 2018 **Master's in Physics**, Mentor: Dr. Ion Garate.
Honors: liste d'honneur aux études supérieures de la Faculté des sciences.
Université de Sherbrooke, Québec, Canada.

2011 – 2016 **Bachelor of Science, Physics,** Mentor: Dr. Víctor Romero-Rochín.
Universidad Nacional Autónoma de México (UNAM), Mexico.

Publications and preprints

2024 **Ramírez-Ruiz, J.,** Grytskyy, D., Mastrogiuseppe, C., Habib Y. & Moreno-Bote, R. (2024). "Complex behavior from intrinsic motivation to occupy future action-state path space". Nature Communications 15, 1, 6368, DOI: 10.1038/s41467-024-49711-1

2024 **Ramírez-Ruiz, J.** & Ebitz, R.B. (2024). "'Value' emerges from imperfect memory." In *International Conference on Simulation of Adaptive Behavior* (pp. 301-313). Cham: Springer Nature Switzerland.

2023 Grytskyy, D., **Ramírez-Ruiz, J**., & Moreno-Bote, R. (2023). "A general Markov decision process formalism for action-state entropy-regularized reward maximization." *arXiv preprint at arXiv:2302.01098.*

2021 **Ramírez-Ruiz, J**., & Moreno-Bote, R. (2021). "Optimal allocation of finite sampling capacity in accumulator models of multi-alternative decision making." Cognitive Science, 46(5), e13143.

2020 Moreno-Bote, R., **Ramírez-Ruiz, J.,** Drugowitsch, J., & Hayden, B. Y. (2020). "Heuristics and optimal solutions to the breadth–depth dilemma." PNAS, 117(33), 19799-19808.

2017 **Ramírez-Ruiz, J.,** Boutin, S., & Garate, I. (2017). "NMR in an electric field: A bulk probe of the hidden spin and orbital polarizations." Physical Review B, 96(23), 235201. Editors' suggestion.

2016 Boutin, S., **Ramírez-Ruiz, J.,** & Garate, I. (2016). "Tight-binding theory of NMR shifts in topological insulators Bi2Se3 and Bi2Te3." Physical Review B, 94(11), 115204.

Conference and workshop presentations

2025 **Ramírez-Ruiz, J.,** Zid, M., Laurie, V.J., Kellil, H., Kehoe, D. & Ebitz, R.B. "The hidden (informational) value of lapses." COSYNE conference, Montreal, Canada. **(Accepted for Poster)**.

2024 **Ramírez-Ruiz, J.** & Ebitz, R.B. "Imperfect memories produce good, value-like decisions."MAIN conference, Montréal, Canada. **(Poster).**

Ramírez-Ruiz, J. & Ebitz, R.B. "'Value' emerges from imperfect memory." International Conference on Simulation of Adaptive Behavior, Irvine, CA, USA. (**Contributed talk**).

Ramírez-Ruiz, J., Grytskyy, D., Mastrogiuseppe, C., Habib, Y. & Moreno-Bote, R. "The maximum occupancy principle (MOP) as a generative model of realistic behavior". Fifth Convention on the Mathematics of Neuroscience and AI, Rome, Italy. **(Poster and Spotlight talk, Best presentation award).**

Ramírez-Ruiz, J., Grytskyy, D., Mastrogiuseppe, C., Habib, Y. & Moreno-Bote, R. "Complex behaviors from intrinsic motivation to occupy action-state path space". UNIQUE Student Symposium, Québec, Canada. **(Best poster award).**

2023 Moreno-Bote, R. & **Ramírez-Ruiz, J**. "Empowerment, Free Energy Principle and Maximum Occupancy Principle Compared". NeurIPS 2023 workshop: Information-Theoretic Principles in Cognitive Systems, New Orleans, USA. **(Poster).**

Ramírez-Ruiz, J., Grytskyy, D., Mastrogiuseppe, C., Habib, Y. & Moreno-Bote, R. "Seeking entropy: Complex behaviors from intrinsic motivation to occupy action-state path space". NeuroAI workshop, Montreal, Canada. **(Poster).**

Ramírez-Ruiz, J., Grytskyy, D., Mastrogiuseppe, C. & Moreno-Bote, R. "A maximum occupancy principle for brains and behavior." CONNECT workshop "Active learning in brains and machines", Marseille, France. **(Invited talk).**

2022 **Ramírez-Ruiz, J**., Grytskyy, D. & Moreno-Bote, R. "Seeking entropy: Complex behaviors from intrinsic motivation to occupy action-state path space." BARCCSYN conference, Barcelona, Spain. **(Selected for talk).**

2021 **Ramírez-Ruiz, J.,** Anzai, A., Drugowitsch, J., DeAngelis, G. and Moreno-Bote R. "Behavioral mechanisms underlying visually-guided control of steering." Spanish Neuroscience Society conference (SENC), Lleida, Spain. **(Poster).**

Ramírez-Ruiz, J. and Moreno-Bote, R. "Optimal allocation of finite sampling capacity in accumulator models of multi-alternative decision making." COSYNE conference, virtual meeting. **(Poster)**.

Ramírez-Ruiz, J., Mastrogiuseppe, C. and Moreno-Bote, R. "Magic number five: The breadth–depth dilemma in accumulator and tree-like models of decision making." BARCCSYN conference, Barcelona, Spain. **(Poster).**

2020 Moreno-Bote, R., **Ramírez-Ruiz, J.,** Drugowitsch, J., & Hayden, B. Y. "The breadth--depth dilemma" Neuromatch conference 2.0, virtual meeting. **(Selected for talk).**

Conference and workshop organization

2025 Co-organization of "PIMBAA: Principles for Intrinsic Motivations in Biological and Artificial Agents" at the Reinforcement Learning and Decision Making (RLDM) conference, June 11-14 in Dublin, Ireland.

Funding, fellowships and prizes

2019 Doctoral scholarship FPI (Spanish Education Ministry).

2016 Mitacs Globalink Graduate Fellowship for a Master's degree in Canada.

2016 Foreign Relations Secretary (Mexico) tuition scholarship for a Master's degree in Québec, Canada.

2015 Mitacs Globalink research internship at the Université de Sherbrooke.

Teaching (assistantships)

2021 Introduction to Network Science/Spanish (UPF)
Computational Neuroscience/English (UPF)
Linear Algebra/Spanish (UPF)

2020 Computational Neuroscience/English (UPF)
Calculus/Spanish (UPF)

2018 Statistical Physics II/French (Université de Sherbrooke).

2015 Statistical Physics/Spanish (UNAM).
Modern Physics/Spanish (UNAM).

Schools, exchanges and research stays

2022	International research stay at the noiseLab led by Dr. Becket Ebitz at the Université de Montréal.
2020	Neuromatch Academy, interactive track.
2019	Cellular, Computational and Cognitive Neuroscience Summer School at Princeton University, USA.
2018	49th IFF Spring school "Physics of Life" in Jülich, Germany.
2013	Exchange semester at the University of California, Santa Barbara.

Interruptions

2022	4-month parental leave (March-July).

Technical skills

Programming languages: Julia, C++, Python and knowledge of Matlab.
Experience with parallel computing techniques PyCUDA and OpenMP.

Languages

Fluent in Spanish, English and French. Basic knowledge of Italian.

Further awards

2010	International Baccalaureate, Diploma Programme. Score of 39 out of 45 points.
	Silver medal representing Mexico at the Ibero-American Physics Olympiad held in Panama City, Panama.