

## CV : ALEXIS DUBREUIL

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Personal: Born 24th of February 1986, French, 2 children  
Languages: French, English, Italian

### EDUCATION

2014 **PhD in Theoretical Neurosciences, Paris Descartes University, Paris, France**  
(supervisor: Nicolas Brunel ; head examiners: Peter Latham, Alessandro Treves)  
Title of the thesis: 'Memory and Cortical Connectivity'.  
2007-2011 **Ecole Normale Supérieure de Cachan, Physics Department, Cachan, France**  
Master « Theoretical Physics of Complex Systems » (Paris 6, 7, 11 and ENS Cachan).  
Bachelor in Physics (Paris 6 University).  
2004-2007 **Classe Préparatoire aux Grandes Ecole, MPSI-PSI, Clermont-Ferrand, France**  
Intensive study of Mathematics and Physics.

### ACADEMIC APPOINTMENTS

10/2021- **Institut des Maladies Neurodégénératives, Université de Bordeaux, CNRS, Bordeaux**  
(chargé de recherche CNRS)  
01/2021-09/2021 **Institut de la Vision, Sorbonne Université, Paris**  
(post-doc, supervisor: Gianluigi Mongillo)  
02/2018-07/2020 **Group for Neural Theory, Ecole Normale Supérieure, Paris**  
(post-doc, supervisor: Srdjan Ostojic)  
10/2016-10/2017 **Laboratory of Theoretical Physics, Ecole Normale Supérieure, Paris**  
(1 year, post-doc, supervisors: Rémi Monasson and Alessandro Treves)  
10/2014-09/2016 **Laboratory of Theoretical Physics, Ecole Normale Supérieure, Paris & Jean Perrin Laboratory, Sorbonne Université, Paris**  
(2 years, post-doc, supervisors: Rémi Monasson and Georges Debrégeas)  
01/2013-08/2014 **Departments of Statistics and Neurobiology, University of Chicago, USA**  
(1 year 6 months, PhD student, supervisor: Nicolas Brunel)  
09/2011-12/2012 **Neurophysics Laboratory, Paris Descartes University, Paris, France**  
(1 year 6 months, PhD student, supervisor: Nicolas Brunel)  
04/2009-08/2010 **OEB Department, Harvard University, USA**  
(1 year 4 months, intern, supervisors: Yoram Burak and Bence P. Ölveczky)

### TEACHING

2016 Paris Descartes University: Course of Computational Neuroscience for L3 undergraduate students majoring in mathematics or computer science (25h).  
2011 and 2012 Ecole Normale Supérieure : TA for the course "Advanced Course in Theoretical Neuroscience" (Cogmaster, ENS/EHESS/P5) (40h).  
2011 and 2012 Université Paris Descartes : TA in physics for first year medical students: fluid mechanics, electromagnetism, diffusion (80h).  
2010 Harvard University: TA for the course "Computational Neuroscience" (30h).

### PUBLICATIONS

[1] Complementary roles of dimensionality and population structure in neural computations  
**A.Dubreuil\***, A.Valente\*, M.Beiran, F.Mastrogiuseppe, S.Ostojic, bioRxiv, accepted at **Nature Neuroscience**, 2020.  
[2] Dynamical system approach to explainability in recurrent neural networks  
**A.Dubreuil**, in *Proceedings of the Conférence Nationale en Intelligence Artificielle*, 2021.  
[3] Network mechanism supporting long-distance-dependencies  
**A.Dubreuil**, A.Leblois, in *Proceedings of the International Joint Conference on Neural Networks*, 2021  
[4] Shaping dynamics with multiple populations in low-rank recurrent networks  
M. Beiran, **A.Dubreuil**, S.Ostojic, bioRxiv, *Neural Computation*, 2021.  
[5] The interplay between randomness and structure during learning in RNNs  
F. Schuessler, F.Mastrogiuseppe, **A.Dubreuil**, S.Ostojic, O.Barak, **NeurIPS**, 2020.  
[6] Dynamics of random recurrent networks with correlated low-rank structure  
F. Schuessler, **A.Dubreuil**, F.Mastrogiuseppe, S.Ostojic, O.Barak, *Physical Review Research*, 2020.  
[7] Disentangling the roles of dimensionality and cell classes in neural computations

**A.M.Dubreuil**, A.Valente, F.Mastrogiuseppe, S.Ostojic, **NeurIPS** workshop Neuro-AI, 2019.

[8] Encoding of multiple spaces in grid-cell networks

D.Spalla\*, **A.M.Dubreuil**\*, R.Monasson, A. Treves, *Neural Computation*, 2019.

[9] Short-term memory properties of sensory neural architectures

**A.M.Dubreuil**, *Journal of Computational Neuroscience*, 2019.

[10] A sensori-motor hub driving phototaxis in zebrafish

S.Wolf\*, **A.M.Dubreuil**\*, T.Bertoni, U.Lucas Böhm, V.Bormuth, R.Candelier, S.Karpenko, D.G.C. Hildebrand, I.Bianco, R.Monasson, G.Debrégeas, **Nature Communications**, 2017.

[11] Rheotaxis of larval zebrafish: behavioral study of a multi-sensory process

R.Olive, S.Wolf, **A.Dubreuil**, V.Bormuth, G.Debrégeas, R.Candelier, *Frontiers in System Neuroscience*, 2016.

[12] Storing structured sparse memories in a large-scale multi-modular cortical network model

**A.M.Dubreuil**, N.Brunel, *Journal of Computational Neuroscience*, 2016.

[13] Memory capacity of networks with stochastic binary synapses

**A.M.Dubreuil**, Y.Amit, N.Brunel, **PLoS Computational Biology**, 2014.

\* equal contributions

### **INVITED and SELECTED TALKS**

“Network mechanism underlying long-distance-dependencies”, July 2021, International Joint Conference on Neural Networks, online.

“Network mechanism underlying long-distance-dependencies”, October 2021, Neuro-AI symposium, Lisbon, Portugal.

“Disentangling the role of dimensionality and cell classes in neural computations”, September 2020, Bernstein workshop, online conference.

“Disentangling the role of dimensionality and cell classes in neural computations”, October 2019, Statistical Physics and Neural Computation, Guangzhou, China.

“A sensori-motor hub driving phototaxis in zebrafish”, September 2017, Neural Coding, Computation and Dynamics, Capbreton, France.

“Dynamical system approach to explainability in recurrent neural networks”, June 2021, Conférence Nationale en Intelligence Artificielle, Bordeaux.

“Disentangling the roles of dimensionality and cell classes in neural computations”, December 2019, GDR NeuralNet, Bordeaux.

### **REVIEWING ACTIVITIES**

Neuroscience: Organization for Computational Neuroscience, Frontiers in Computational Neuroscience, PLoS Computational Biology, COSYNE.

Artificial Intelligence: NeurIPS, ICLR, ICML

Physics: Physical Review Letter, Physical review E.

### **GRANTS and AWARDS**

Elève Normalien (2007, 4 years, 80k€)

Prix international de l'ENS Cachan (2009, master internship grant, 2k€)

Allocation Spécifique Normalien (2011, PhD grant, 3 years, 90k€)

Post-doctoral fellowship from Fondation Pierre-Gilles de Gennes (2014, 1 year, 50k€)

Travel grant, COSYNE Conference, awarded to the 20/1000 best graded submissions (2019, 1,5k€)

Child care grant, COSYNE Conference (2019, 1k€)