

# Sébastien Bubeck

Born April 16, 1985

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research blog: [blogs.princeton.edu/imabandit](http://blogs.princeton.edu/imabandit)

## Appointments

- 2014–Present    Researcher, Microsoft Research, Theory Group (Redmond, WA).
- 2011–2014      Assistant Professor, Princeton University, Department of Operations Research and Financial Engineering (Princeton, NJ).
- Fall 2013        Visiting Scientist, Simons Institute, UC Berkeley (Berkeley, CA).
- 2010 – 2011    Postdoc, Centre de Recerca Matemàtica (Barcelona, Spain).
- 2007 – 2010    PhD student (speciality: Mathematics), INRIA Nord Europe, Sequel team; and teaching assistant at the University of Lille 1 (Lille, France).
- 2005 – 2008    Student at Ecole Normale Supérieure de Cachan (Cachan, France).

## Diplomas, Awards, Grants

- 2016            Best Paper Award at COLT (Conference on Learning Theory) 2016.
- 2015            Alfred P. Sloan Research Fellow in Computer Science.
- 2011            Second prize for the best French Ph.D in Artificial Intelligence (AI prize 2011).
- 2010            Jacques Neveu prize 2010 for the best French Ph.D in Probability/Statistics.
- 2010            Second prize for the best French Ph.D in Computer Science (Gilles Kahn prize 2010).
- 2010            Centre de Recerca Matemàtica Postdoctoral Grant.
- 2010            Ph.D of the Mathematics Department, University of Lille 1.
- 2009            Best Student Paper Award at COLT (Conference on Learning Theory) 2009.
- 2007            MSc Mathematics, ENS Cachan, summa cum laude.
- 2005            BSc Mathematics, ENS Cachan, summa cum laude.

## Professional service

Program Committee member at: COLT 2013/2014/2015/2016/2017, NIPS 2012/2014/2016, ICML 2015/2016, ALT 2013/2014, SODA 2017.

COLT steering committee member (elected) from 2014 to 2017.

## Events organization

- Optimization, Statistics and Uncertainty workshop at the Simons Institute (2017).
- INRIA-MSR 2016 workshop on Networks: learning, information and complexity.
- UW-MSR 2015 Research Institute on Stochastic Processes, Learning, and Optimization.
- Mathematics of Machine Learning program at the CRM in Barcelona (May–July 2014).
- COLT 2014 in Barcelona.
- COLT 2013 at Princeton University.

## Preprints

- 52 M. Racz and S. Bubeck, *Basic models and questions in statistical network analysis*.  
Preprint, 2016.
- 51 S. Bubeck, R. Eldan, and Y. T. Lee, *Kernel-based methods for bandit convex optimization*.  
Preprint, 2016.
- 50 S. Bubeck, K. Edwards, H. Mania, and C. Supko, *On paths, stars and wyes in trees*.  
Preprint, 2016.
- 49 S. Bubeck and E. Gwynne, *Asymptotic behavior of the Eden model with positively homogeneous edge weights*.  
Preprint, 2015.
- 48 S. Bubeck, Y. T. Lee, and M. Singh, *A geometric alternative to Nesterov's accelerated gradient descent*.  
Preprint, 2015.
- 47 S. Bubeck, J. Lehec, and R. Eldan, *Sampling from a log-concave distribution with Projected Langevin Monte Carlo*.  
Preprint, 2015.
- 46 E. Arias-Castro, S. Bubeck, G. Lugosi and N. Verzelen, *Detecting Markov Random Fields Hidden in White Noise*.  
Preprint, 2015.

## Publications

- 45 S. Bubeck and S. Ganguly, *Entropic CLT and phase-transition for high-dimensional Wishart matrices*.  
To appear in International Mathematics Research Notices, 2015.
- 44 S. Bubeck and R. Eldan, *Multi-scale exploration of convex functions and bandit convex optimization*.  
COLT, 2016 (**Best Paper Award**).
- 43 S. Bubeck and Y. T. Lee, *Black box optimization with a politician*.  
ICML, 2016.
- 42 S. Bubeck, R. Eldan, E. Mossel and M. Racz, *From trees to seeds: on the inference of the seed from large trees in the uniform attachment model*.  
To appear in Bernoulli, 2016.
- 41 S. Bubeck, *Convex Optimization: Algorithms and Complexity*.  
In *Foundations and Trends in Machine Learning*, Vol. 8: No. 3-4, 231-357, 2015.

- 40 L. Addario-Berry, S. Bhamidi, S. Bubeck, L. Devroye, G. Lugosi, and R. Imbuzeiro Oliveira, *Exceptional rotations of random graphs: a VC theory*. *Journal of Machine Learning Research (JMLR)*, 16, 1893–1922, 2015.
- 39 S. Bubeck, J. Ding, R. Eldan and M. Racz, *Testing for high-dimensional geometry in random graphs*.  
To appear in *Random Structures and Algorithms*, 2015.
- 38 S. Bubeck, L. Devroye and G. Lugosi, *Finding Adam in random growing trees*.  
To appear in *Random Structures and Algorithms*, 2015.
- 37 S. Bubeck, O. Dekel, T. Koren and Yuval Peres, *Bandit Convex Optimization:  $\sqrt{T}$  Regret in One Dimension*.  
In *Proceedings of the 28th Annual Conference on Learning Theory (COLT)*, 2015.
- 36 S. Bubeck and R. Eldan, *The entropic barrier: a simple and optimal universal self-concordant barrier*.  
In *Proceedings of the 28th Annual Conference on Learning Theory (COLT)*, 2015.
- 35 S. Bubeck, E. Mossel and M. Racz, *On the influence of the seed graph in the preferential attachment model*.  
*IEEE Transactions on Network Science and Engineering*, 2(1):30–39, 2015.
- 34 S. Bubeck and N. Linial, *On the local profiles of trees*.  
*Journal of Graph Theory*, 2015.
- 33 C. Y. Liu and S. Bubeck, *Most Correlated Arms Identification*.  
In *Proceedings of the 25th Annual Conference on Learning Theory (COLT)*, 2014.
- 32 K. Jamieson, M. Malloy, S. Bubeck and R. Nowak, *lil' UCB: An Optimal Exploration Algorithm for Multi-Armed Bandits*.  
In *Proceedings of the 25th Annual Conference on Learning Theory (COLT)*, 2014.
- 31 K. Jamieson, M. Malloy, S. Bubeck and R. Nowak, *On Finding the Largest Mean Among Many*.  
Asilomar Conference on Signals, Systems and Computers, 2013.
30. S. Bubeck and C. Y. Liu, *Prior-free and prior-dependent regret bounds for Thompson Sampling*.  
In *Advances in Neural Information Processing Systems (NIPS)* 26, 2013.
29. E. Arias-Castro, S. Bubeck and G. Lugosi, *Detecting Positive Correlations in a Multivariate Sample*.  
*Bernoulli*, 21:209–241, 2015.
28. S. Bubeck, N. Cesa-Bianchi and G. Lugosi, *Bandits with heavy tail*.  
*IEEE Transactions in Information Theory*, 59, 7711–7717, 2013.
27. S. Bubeck, V. Perchet and P. Rigollet, *Bounded regret in stochastic multi-armed bandits*.  
In *Proceedings of the 26th Annual Conference on Learning Theory (COLT)*, 2013.
26. S. Bubeck, *The complexities of optimization*.  
Lecture Notes, 2013.
25. J.Y. Audibert, S. Bubeck and G. Lugosi, *Regret in Online Combinatorial Optimization*.  
*Mathematics of Operations Research*, 39, 31–45, 2014.
24. S. Bubeck, D. Ernst and A. Garivier, *Optimal discovery with probabilistic expert advice: finite time analysis and macroscopic optimality*.  
*Journal of Machine Learning Research (JMLR)*, 14, 601–623, 2013.
23. S. Bubeck, T. Wang and N. Viswanathan, *Multiple Identifications in Multi-Armed Bandits*.  
In *Proceedings of the 30th International Conference on Machine Learning (ICML)*, 2013.

22. S. Bubeck and N. Cesa-Bianchi, *Regret Analysis of Stochastic and Nonstochastic Multi-armed Bandit Problems*.  
In *Foundations and Trends in Machine Learning*, Vol. 5: No 1, 1-122, 2012.
21. S. Bubeck, D. Ernst and A. Garivier, *Optimal discovery with probabilistic expert advice*.  
In *51st IEEE Conference on Decision and Control (CDC)*, 2012.
20. S. Bubeck, N. Cesa-Bianchi and S. M. Kakade, *Towards Minimax Policies for Online Linear Optimization with Bandit Feedback*.  
In *Proceedings of the 25th Annual Conference on Learning Theory (COLT)*, 2012.
19. S. Bubeck and A. Slivkins, *The best of both worlds: stochastic and adversarial bandits*.  
In *Proceedings of the 25th Annual Conference on Learning Theory (COLT)*, 2012.
18. E. Arias-Castro, S. Bubeck and G. Lugosi, *Detection of correlations*.  
*Annals of Statistics*, 40, 412-435, 2012.
17. S. Bubeck, *Introduction to Online Optimization*.  
Lecture Notes, 2011.
16. V. Gabillon, M. Ghavamzadeh, A. Lazaric and S. Bubeck, *Multi-Bandit Best Arm Identification*.  
In *Advances in Neural Information Processing Systems (NIPS) 24*, 2011.
15. S. Bubeck, G. Stoltz and J. Y. Yu, *Lipschitz Bandits without the Lipschitz Constant*.  
In *Proceedings of the 22nd International Conference on Algorithmic Learning Theory (ALT)*, 2011.
14. J.Y. Audibert, S. Bubeck and G. Lugosi, *Minimax Policies for Combinatorial Prediction Games*.  
In *Proceedings of the 24th Annual Conference on Learning Theory (COLT)*, 2011.
13. S. Bubeck, R. Munos, G. Stoltz and C. Szepesvári,  *$\mathcal{X}$ -Armed Bandits*.  
*Journal of Machine Learning Research (JMLR)*, 12, 1587-1627, 2011.
12. S. Bubeck, R. Munos and G. Stoltz, *Pure Exploration in Finitely-Armed and Continuously-Armed Bandits*.  
*Theoretical Computer Science*, 412, 1832-1852, 2011.
11. J.Y. Audibert, S. Bubeck and R. Munos, *Bandit View on Stochastic Optimization*.  
In S. Sra, S. Nowozin, S. J. Wright., editors, *Optimization for Machine Learning*, MIT Press, 2011.
10. J.Y. Audibert and S. Bubeck, *Regret Bounds and Minimax Policies under Partial Monitoring*.  
*Journal of Machine Learning Research (JMLR)*. 11, 2635-2686, 2010.
9. S. Bubeck, *Bandits Games and Clustering Foundations*.  
*PhD dissertation*, Université Lille 1, 2010 (**Jacques Neveu prize 2010, runner-up for the Gilles Kahn prize 2010, runner-up for the french AI prize 2011**).
8. J.Y. Audibert, S. Bubeck and R. Munos, *Best Arm Identification in Multi-Armed Bandits*.  
In *Proceedings of the 23rd Annual Conference on Learning Theory (COLT)*, 2010.
7. S. Bubeck and R. Munos, *Open-Loop Optimistic Planning*.  
In *Proceedings of the 23rd Annual Conference on Learning Theory (COLT)*, 2010.
6. S. Bubeck, R. Munos and G. Stoltz, *Pure Exploration in Multi-Armed Bandit Problems*.  
In *Proceedings of the 20th International Conference on Algorithmic Learning Theory (ALT)*, 2009.

5. S. Bubeck, M. Meila and U. von Luxburg, *How the Initialization Affects the Stability of the  $k$ -means Algorithm*.  
*ESAIM: Probability and Statistics*, 16, 436-452, 2012.
4. J.Y. Audibert and S. Bubeck, *Minimax Policies for Adversarial and Stochastic Bandits*.  
In *Proceedings of the 22nd Annual Conference on Learning Theory (COLT)*, 2009 (**Best Student Paper Award**).
3. S. Bubeck, R. Munos, G. Stoltz and C. Szepesvári, *Online Optimization in  $\mathcal{X}$ -Armed Bandits*.  
In *Advances in Neural Information Processing Systems (NIPS)* 22, 2009.
2. S. Bubeck and U. von Luxburg, *Nearest Neighbor Clustering: A Baseline Method for Consistent Clustering with Arbitrary Objective Functions*.  
*Journal of Machine Learning Research (JMLR)* 10, 657-698, 2009.
1. U. von Luxburg, S. Bubeck, S. Jegelka and M. Kaufmann, *Consistent Minimization of Clustering Objective Functions*.  
In *Advances in Neural Information Processing Systems (NIPS)* 21, 2008.

## Talks

- University of Chicago Booth, March 29th, 2016.
- University of Chicago Statistics department, March 28th, 2016.
- Weizmann Institute, March 9th, 2016
- Keynote speaker, 10th NYC Machine Learning Symposium, NY Academy of Science, March 4th, 2016.
- Stochastic Methods in Game Theory, Singapore, November 19th, 2015.
- MSR Machine Learning workshop, Redmond (WA, USA), November 13th, 2015.
- Sequential Learning and Applications, Toulouse (France), November 10th, 2015
- Theory Seminar, Princeton University, Princeton (NJ, USA), October 8th, 2015.
- EE colloquium, Princeton University, Princeton (NJ, USA), October 7th, 2015.
- Theory Seminar, University of Washington, Seattle (WA, USA), October 6th, 2015.
- Microsoft Research, Machine Learning Lunch, Redmond (WA, USA), September 18th, 2015.
- Mathematical and Computational Foundations of Learning Theory, Dagstuhl (Germany), September 1st, 2015.
- COLT 2015, Paris (France), July 3rd, 2015.
- Challenges in Optimization for Data Science, Paris (France), July 1st, 2015.
- Graphical Models, Statistical Inference, and Algorithms, IMA (MN, USA), May 20th, 2015.
- Trends in optimization seminar at UW, Seattle (WA, USA), May 12th, 2015.
- Machine learning seminar at NYU, New York (NY, USA), April 28th, 2015.
- ISyE, Georgia tech, Atlanta (GA, USA), April 27th, 2015.
- Functional analysis seminar at Jussieu, April 2nd, 2015.

- Probability and Statistics seminar at Orsay, April 2nd, 2015.
- Paris Machine Learning Seminar, Paris (France), March 30th, 2015.
- Microsoft Research, Machine Learning Lunch, Redmond (WA, USA), March 20th, 2015.
- Convexity and optimization, IMA (MN, USA), February 25th, 2015.
- UW-MSR Machine Learning day, Redmond (WA, USA), February 20th, 2015.
- Optimization seminar, Princeton University, Princeton (NJ, USA), February 17th, 2015.
- PACM colloquium, Princeton University, Princeton (NJ, USA), February 16th, 2015.
- Optimization and statistical learning, Les Houches (France), January 12th, 2015.
- New procedures for new data, CIRM, Luminy (France), December 18th, 2014.
- Big Data reunion workshop, Simons Institute, UC Berkeley (CA, USA), December 15th, 2014.
- Microsoft Research, Machine Learning Lunch, Redmond (WA, USA), December 5th, 2014.
- Probability Seminar, University of Washington, Seattle (WA, USA), December 1st, 2014.
- Theory Seminar, University of Washington, Seattle (WA, USA), November 11th, 2014.
- Random trees workshop, Oberwolfach (Germany), November 3rd and 6th, 2014.
- AMS sectional meeting, San Francisco (CA, USA), October 25th, 2014.
- Microsoft theory day, Redmond (WA, USA), October 15th, 2014.
- CLAPEM XIII, Cartagena (Colombia), September 22nd, 2014.
- Microsoft Research, NYC (NY, USA), September 11th, 2014.
- Microsoft Research, Machine Learning Lunch, Redmond (WA, USA), August 8th, 2014.
- Microsoft Research, Theory Lunch, Redmond (WA, USA), July 30th, 2014.
- Tutorial at Sigmetrics 2014, Austin (TX, USA), June 20th 2014.
- COLT 2014, Barcelona (Spain), June 14th 2014.
- High dimensional probability VII, Cargese (France), May 30th 2014.
- Random graphs workshop, Nice (France), May 14th 2014.
- Centre de Recerca Matemàtica, Barcelona (Spain), May 8th 2014.
- MIT Stochastics and Statistics Seminar, MIT (MA, USA), April 18th, 2014.
- Statlearn'14, Paris (France), April 8th, 2014.
- Oxford-Princeton Workshop, Oxford (UK), March 21st, 2013.
- Electrical and Computer Engineering department, North Carolina State University (NC, USA), February 28th, 2013.
- Neyman seminar, UC Berkeley (CA, USA), January 29th, 2013.
- Microsoft Research, Redmond (WA, USA), January 22nd, 2013.
- Invited talks for two workshops at NIPS 2013, Lake Tahoe (CA, USA), December 10th, 2013.
- Neyman seminar, UC Berkeley (CA, USA), December 4th, 2013.

- Microsoft Research, Redmond (WA, USA), November 20th, 2013.
- Information Systems Laboratory Colloquium, Stanford (CA, USA), November 14th, 2013.
- AMPLab, UC Berkeley (CA, USA), October 15th, 2013.
- Big Data seminar, Simons Institute (CA, USA), September 24th, 2013.
- International workshop on statistical learning, Moscow (Russia), June 26th, 2013.
- ICML 2013, Atlanta (GA, USA), June 18th, 2013.
- COLT 2013, Princeton (NJ, USA), June 14th, 2013.
- Department of Economics and Business, Universitat Pompeu Fabra (Barcelona, Spain), May 23rd, 2013.
- Department of Electrical Engineering, Stanford (CA, USA), May 9th, 2013.
- Microsoft Research, NYC (NY, USA), May 7th, 2013.
- Information Theory and Applications, San Diego (CA, USA), February 15th, 2013.
- School of Mathematics, Georgia Tech, Atlanta (GA, USA), January 24th, 2013.
- Institute for Advanced Study, Princeton (NJ, USA), January 21st, 2013.
- Paris game theory seminar (France), January 14th, 2013.
- Optimization and Statistical Learning workshop, Les Houches (France), January 11th, 2013.
- CDC 2012, Maui (Hawaii, USA), December 13th, 2012.
- Neuroscience Institute at Princeton University, Princeton (NJ, USA), November 8th, 2012.
- Tutorial at ACML 2012, Singapore (Republic of Singapore), November 4th, 2012.
- Department of Management Science and Information Systems and RUTCOR Seminar, Rutgers University, Newark (NJ, USA), September 24th, 2012.
- Journées MAS 2012, invited talk for the Jacques Neveu prize 2010, Clermont-Ferrand (France), August 28th, 2012.
- ICML 2012 workshop (invited talk), Exploration and Exploitation 3, Edinburgh (Scotland), July 1st, 2012.
- COLT 2012, Edinburgh (Scotland), June 25th, 2012.
- Department of Electrical and Computer Engineering University of Wisconsin-Madison, Madison (WI, USA), June 6th, 2012.
- Department of Electrical Engineering, Princeton University, Princeton (NJ, USA), May 3rd, 2012.
- Computer Science Department, Rutgers University, New Brunswick (NJ, USA), April 30th, 2012.
- INFORMS 2011, Charlotte (NC, USA), October 15th, 2011.
- Tutorial at ALT 2011, Espoo (Finland), October 5th, 2011.
- Oberwolfach workshop (Germany), August 21st, 2011.
- Dagstuhl workshop (Germany), July 19th, 2011.
- COLT 2011, Budapest (Hungary), July 10th, 2011.

- Department of Operations Research and Financial Engineering, Princeton University, Princeton (NJ, USA), February 21th, 2011.
- Sequel team, INRIA Nord Europe, Lille (France), February 14th, 2011.
- Gilles Kahn prize 2010, Grenoble (France), February 3rd, 2011
- ENST, Paris (France), November 19th, 2010.
- Journées MAS 2010, Bordeaux (France), September 1st, 2010.
- COLT 2010, Haifa (Israel), June 29th, 2010.
- Ph.D defense, ENS, Paris (France), June 10th, 2010.
- JFPDA 2010, Besançon (France), June 1st, 2010.
- TRaSH 2010, Paris (France), March 24/25th, 2010.
- Sequel team, INRIA Lille, October 23th, 2009.
- ALT 2009, Porto (Portugal), October 3rd 2009.
- ANR EXPLO-RA, ENS, Paris (France), June 23th, 2009.
- COLT 2009, Montreal (Canada), June 20th, 2009.
- Sequel team, INRIA Lille, April 3rd, 2009.
- ANR EXPLO-RA, ENS, Paris (France), January 16th, 2009.
- OPT 2008, NIPS Workshop, Whistler (Canada) , December 12th, 2008.
- Working group Learning, ENS, Paris (France), May 19th, 2008.
- Working group ITstat, ENST, Paris (France), April 4th, 2008.
- Sequel team, INRIA Lille, September 7th, 2007.

## Teaching

2012–2013/2013–2014

- ORF 523: graduate course on Advanced Optimization. ORFE, Princeton University.
- ORF 245: undergraduate course, Fundamentals of Engineering Statistics. ORFE, Princeton University.

2011–2012

- ORF 570: graduate course on Online Convex Optimization. ORFE, Princeton University.
- ORF 245: undergraduate course, Fundamentals of Engineering Statistics. ORFE, Princeton University.

2009–2010

- Problem sessions in Reinforcement Learning at the MVA, ENS Cachan (Graduate).
- Problem sessions in Real Analysis and Probability at Telecom Lille (Undergraduate).
- Weekly oral examination in the Classes Préparatoires of the lycée Faidherbe, Lille.

2008–2009

- Problem sessions in Reinforcement Learning at the MVA, ENS Cachan (Graduate).
- Problem sessions in Numerical Analysis at the University of Lille 1 (Undergraduate).
- Problem sessions in Linear Algebra at the University of Lille 1 (Undergraduate).
- Weekly oral examination in the Classes Préparatoires of the lycée Faidherbe, Lille.

2007–2008

- Problem sessions in Reinforcement Learning at the MVA, ENS Cachan (Graduate).

2006–2007

- Weekly oral examination in the Classes Préparatoires of the lycée Lakanal, Sceaux.

## Supervised students

Graduate students:

- Che-Yu Liu (ORFE)
- Miklos Racz (intern at Microsoft)
- Yin Tat Lee (intern at Microsoft)
- Ewain Gwynne (intern at Microsoft)
- Shirshendu Ganguly (intern at Microsoft)
- Fan Wei (intern at Microsoft)

Undergraduate students:

- Horia Mania, 2013-2014 (Math)
- Dorothy Mittow, 2013-2014 (ORFE)
- Christian Fong, 2013-2014 (ORFE)
- Akshay Kumar, 2013-2014 (ORFE)
- Chengmu Yan, 2013-2014 (ORFE)
- Gokce Avcisert, 2012-2013 (ORFE)
- Nishant Gurnani, 2012-2013 (Math)
- Damjan Korac, 2012-2013 (ORFE)
- Krishnan Mody, 2012-2013 (Math)
- Mihai Roman, 2012-2013 (CS)
- Frank Xiao, 2012-2013 (Math)
- Shafiq Kashmiri, 2011-2012 (ORFE)
- Nitin Viswanathan, 2011-2012 (CS)
- Tengyao Wang, 2011-2012 (Math)