

Marwa Banna

Postdoctoral Researcher

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Curriculum Vitæ

Research Interests

Random Matrices.
Free Probability Theory.
Matrix concentration inequalities.
Mathematical aspects of machine learning.
Mixing and weak dependence.

Employment

- Oct. 2016 - present **Postdoctoral researcher**, within Prof. Roland Speicher's team.
Saarland University, Saarbrücken, Germany
- Oct. 2015 - Sept. 2016 **CNRS Postdoctoral researcher**, with Prof. Walid Hachem.
CNRS - Télécom ParisTech, France
- Oct. 2012 - Sept. 2015 **Graduate Teaching Assistant**.
Université Paris-Est Marne-la-Vallée, France

Publications

1. **Limiting spectral distribution of large sample covariance matrices associated with a class of stationary processes**, joint work with Florence Merlevède, "*Journal of Theoretical Probability*".
2. **On the limiting spectral distribution for a large class of random matrices with correlated entries**, joint work with Florence Merlevède and Magda Peligrad, "*Stochastic Processes and their Applications*".
3. **Limiting spectral distribution of high dimensional Gram matrices associated with functionals of β -mixing processes**, "*Journal of Mathematical Analysis and Applications*".
4. **Bernstein type inequality for a class of dependent random matrices**, joint work with Florence Merlevède and Pierre Youssef. "*Random Matrices: Theory and Applications*".
5. **A CLT for linear spectral statistics of large random information-plus-noise matrices**, joint work with Jamal Najim and Jianfeng Yao. "*Stochastic Processes and their Applications*".
6. **Hölder continuity of cumulative distribution functions for noncommutative polynomials under finite free Fisher information**, joint work with Tobias Mai. "*Journal of Functional Analysis*".
7. **Matrix Poincaré Inequalities and Concentration**, joint work with Richard Aoun and Pierre Youssef. "*Advances in Mathematics*".

Submitted papers

8. **Operator-valued matrices with free or exchangeable entries**, joint work with Guillaume Cébron. *arXiv:1809.11153*.

Awards

- 2012-2015 **Doctoral grant**, delivered by the doctoral school MSTIC of Université Paris-Est.
2011-2012 **Master 2 Bézout Excellency Track Scholarship**, delivered by Université Paris-Est Marne-La-Vallée.
2010-2011 **Award of excellence**, delivered by the Lebanese University for being ranked first during my undergraduate studies.

PhD Thesis

Oct. 2012 - **PhD thesis in Mathematics**, Université Paris-Est.

Sept. 2015 *Thesis Advisors:* Florence Merlevède and Emmanuel Rio.

Title: Limiting Spectral Distribution of Random Matrices With Correlated Entries and Bernstein-type Inequalities.

Defended on the 25th of September 2015 before the jury composed of:

Florent Benaych-Georges	Examiner	Professor, Université Paris Descartes
Włodzimierz Bryc	Reporter	Professor, University of Cincinnati
Bernard Delyon	Reporter	Professor, Université de Rennes 1
Olivier Guédon	Examiner	Professor, UPEM
Walid Hachem	Examiner	CNRS research director, Télécom ParisTech
Florence Merlevède	Advisor	Professor, UPEM
Jamal Najim	Examiner	CNRS research director, UPEM
Emmanuel Rio	Advisor	Professor, Université de Versailles

Mention: Very honorable.

Qualifications and Education

Oct. 2012 - **PhD in Mathematics**, Université Paris-Est.

Sept. 2015 *Mention:* Very honorable.

2011-2012 **Master 2 Research, Applied Mathematics**, Labex Bézout, Université Paris-Est Marne-la-Vallée, France.

Master thesis advisor: Florence Merlevède

Mention: Very good (Ranked first).

2011-2012 **Master 1 Research**, Lebanese University, Hadath, Lebanon.

Mention: Good (Ranked first).

2008-2011 **Bachelor of Mathematics**, Lebanese University, Hadath, Lebanon.

Mention: Good (Ranked first).

2007-2008 **Scientific Baccalaureate**, Maroun Abboud Secondary School, Lebanon.

Mention: Very good.

The above mentions are with respect to the French grading system.

Scientific Activity

Research Visits

Sept. 28- Oct. 16, 2014 **University of Alberta**, Edmonton, Canada.

8 - 12 May 2017 **Université Paul Sabatier**, Toulouse, France.

12 - 16 Nov. 2018 **Université Paul Sabatier**, Toulouse, France.

15 - 19 July 2019 **Université Paris Diderot**, Paris, France.

26 - 29 August 2019 **American University of Beirut**, Beirut, Lebanon.

Talks at conferences

9 Dec. 2019 **Random Matrices**, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany.

25 July 2019 **30th International Workshop on Operator Theory and its Applications: IWOTA**, Instituto Superior Técnico, Lisbon, Portugal.

- 20 June 2019 **Journées IOPS - Image, Optimisation, Probabilités et Statistique**, Université de Bordeaux, Teich bird reserve, Le Teich, France.
- 2 May 2019 **Random Matrix Theory: Applications in the Information Era**, Jagellonian University, Cracow, Poland.
- 6 March 2019 **Free Probability: the theory, its extensions**, CRM, Montreal, Canada.
- 5 Dec. 2018 **Mathematisches Forschungsinstitut Oberwolfach**, Oberwolfach, Germany.
- 17 Nov. 2017 **Distributional symmetries and independence**, Bordeaux, France.
- 8 Nov. 2017 **Seminario Interinstitucional de Matrices Aleatorias: Probabilidad Libre**, CIMAT, Guanajuato, Mexico.
- 9 Dec. 2016 **Analytic versus Combinatorial in Free Probability**, *Banff International Research Station, Banff, Canada*.
- 31 August 2016 **Journées MAS 2016**, Grenoble, France.
- 17 March 2016 **Rencontre: Martingales, chaînes de Markov et Systèmes dynamiques**, Brest, France.
- 3 Dec. 2015 **Journées du Gdr Analyse Fonctionnelle, Harmonique et Probabilités**, CIRM, France.
- 26 May 2015 **Journées de probabilités 2015**, Institut de Mathématique de Toulouse, France.
- 26 May 2014 **Young Women in Probability**, Bonn, Germany.
- 7 April 2014 **Onzième Colloque Jeunes Probabilistes et Statisticiens**, *Forges-les-Eaux, France*.
- [Talks at seminars](#)
- 14 May 2019 **Noncommutative Harmonic Analysis Seminar**, Université de Caen, Caen, France.
- 29 March 2018 **Probability Seminar**, University of Melbourne, Melbourne, Australia.
- 9 Feb. 2017 **Probability Seminar**, Université du Luxembourg, Luxembourg.
- 6 Oct. 2016 **Séminaire modélisation stochastique**, Université Paris-Diderot, France.
- 6 Sept. 2016 **Random matrix seminar**, *Universität des Saarlandes, Saarbrücken, Germany*.
- 7 June 2016 **Séminaire de Probabilités et Statistiques**, Université de Versailles-Saint-Quentin-en-Yvelines, France.
- 30 May 2016 **Groupe de travail Probabilités, Théorie Ergodique et Systèmes Dynamiques**, Université de Rouen, France.
- 27 Nov. 2015 **Séminaire Calcul stochastique**, Université de Strasbourg, France.
- 16 Jan. 2015 **Groupe de travail Matrices Et Graphes Aléatoires (Mega)**, Institut Henri Poincaré, France.
- 7 Oct. 2014 **Seminar of Analysis**, University of Alberta, Canada.
- 1 Oct. 2014 **Seminar of Analysis**, University of Alberta, Canada.
- 20 May 2014 **Séminaire de Probabilités et Statistiques**, Université de Versailles-Saint-Quentin-en-Yvelines, France.
- 30 April 2014 **Séminaire des doctorants du LAMA**, *Université Paris-Est Créteil, France*.
- 19 Feb. 2013 **Groupe de travail ASPRO**, Université Paris-Est Marne-la-Vallée, France.
- [Participation at other conferences and Summer Schools](#)
- 15 - 19 April 2019 **Random Matrices and Random Graphs**, CIRM, Marseille, France.
- 1 - 30 March 2019 **One-month program "New Developments in Free Probability and Applications"**, CRM, Montreal, Canada.
- 7 - 9 Oct. 2018 **Brown measures and non-normal random matrices**, Mathematics Institute of Toulouse, Toulouse, France.
- 8 - 12 Oct. 2018 **Cohomology of quantum groups and quantum automorphism groups of finite graphs**, Saarland University, Saarbrücken, Germany.
- 22 June 2018 **Journée RMT meets theoretical physics**, Université Paris Descartes, Paris, France.
- 25 June - 15 July 2017 **Park City summer school on random matrices**, PCMI, Park City, USA.

- 3 - 7 April 2017 **Probably ON Random Matrices**, ENS de Lyon, Lyon, France.
- 13 - 25 June 2016 **2016 Summer School on Random Matrices**, University of Michigan, USA.
- 2 - 4 May 2016 **Random matrices, free probability and determinantal processes**, Université de Lille 1, France.
- 26 - 30 Oct. 2015 **Convexity, probability and discrete structures, a geometric view point**, Université Paris-Est Marne-la-Vallée, France.
- 11 - 13 May 2015 **Dependence, Limit Theorems and Applications**, *Conférence en l'honneur de Paul Doukhan*, Institut Henri Poincaré, France.
- 12, 13 Fev. 2015 **Journées Matrices Aléatoires et Applications**, *L'Université de Versailles Saint-Quentin-en-Yvelines*, France.
- Jan. 2015 **Journées YSP (Young Statisticians and Probabilists)**, Institut Henri Poincaré, France.
- 1 - 4 Dec. 2014 **États de la recherche en matrices aléatoires**, Institut Henri Poincaré, France.
- 8-10 Oct. 2013 **Random matrices and their applications**, *Télécom Paristech*, France.
[Forthcoming conferences](#)
- 8 - 12 June 2020 **Free Probability - on the occasion of Roland Speicher's 60th birthday**, Saarland University, Saarbrücken, Germany.
- 17 - 21 August 2020 **International Workshop on Operator Theory and its Applications: IWOTA**, Lancaster University, Lancaster, UK.
[Organization of seminars](#)
- PhD-student seminar of LAMA.** Co-organizer of the PhD-student seminar of Laboratoire d'Analyse et Mathématiques Appliquées (LAMA). This is a general seminar that consists of two talks of 45 minutes and takes place twice a month at Université Paris-Est Marne-la-Vallée and Université Paris-Est Créteil alternatively.
- Sept. 2014 - Sept. 2015 **Co-organizer of the PhD-student seminar of LAMA**, Université Paris-Est Marne-la-Vallée, France.
- March 2015- Sept. 2015 **Representor of PhD students and postdocs at LAMA department council**, Université Paris-Est Marne-la-Vallée, France.

Teaching

2012-2013

- 18hrs **Statistics and Probability**, *Specialty: Physics*.
- 22hrs **Statistics and Probability**, *Specialty: Economical Sciences*.
- 18hrs **Geometry**, *Specialty: Pure Mathematics*.
- 24hrs **Oral evaluations in Algebra, Analysis and Probability**, *Specialty: Mathematics*.

2013-2014

- 38hrs **Analysis**, *Specialty: Pure Mathematics and Computer Science*.
- 36hrs **Analysis**, *Specialty: Pure Mathematics*.
- 18hrs **Geometry**, *Specialty: Pure Mathematics*.

2014-2015

- 18hrs **Linear Algebra**, *Specialty: Physics*.

2015-2016

- 24hrs **Statistics and Probability**, *Specialty: Physics*.

2017-2018

- 4 h/w **Random Matrices**, *Specialty: Mathematics*, (joint with Prof. Roland Speicher).

SoSe 2020

- 2+1 h/w **High-dimensional Probability with Applications to Big Data Sciences**, *Specialty: Mathematics and Computer Science*.

2 h/w **Student seminar on "Gaussian Hilbert Spaces"**, *Specialty: Mathematics*, (joint with Dr. Tobias Mai).
The content of the lectures is detailed in the teaching statement.

Personal Data

Nationality **French-Lebanese double citizenship.**

Marital status **Single.**

Date & Place of birth **16 July 1989, Majdel Baana, Lebanon.**

Languages **Arabic** (*fluent*), **English** (*fluent*), **French** (*fluent*), **German** (*level : A1*).