

Pierre Youssef

Maître de conférences

✉ youssef@math.univ-paris-diderot.fr
<http://www.lpma-paris.fr/pageperso/youssef/>

Research interests

Random matrices and spectrum of random graphs, Geometric Functional Analysis, concentration inequalities, high dimensional convex geometry, matrix column selection problems and data reduction.

Employment

- 2015- **Maître de conférences** ($\sim$ Assistant professor), *Laboratoire de Probabilités et de Modèles aléatoires*, Université Paris Diderot, France.
- Aug-Dec 2017 **MSRI Postdoctoral fellow**, *Mathematical Sciences Research Institute*, Berkeley, USA.
- 2013-2015 **CNRS/PIMS Postdoctoral fellow**, *under the supervision of Nicole Tomczak-Jaegermann and Alexander Litvak*, University of Alberta, Canada.
- 2010-2013 **Teaching assistant**, *University Paris-Est Marne-la-Vallée*, France.

Education

- 2010-2013 **PhD in mathematics**, *Université Paris-Est Marne-la-Vallée*, under the supervision of Olivier Guédon.
Title: Restricted invertibility, distance to the cube and covariance of random matrices. Defended on May 21, 2013.
- 2009-2010 **Master in pure mathematics: Second year**, *Université Pierre et Marie Curie- Paris VI*, Highest honors.
Master thesis codirected by Dario Cordero-Erausquin and Olivier Guédon.
Title: Restricted invertibility and the Banach-Mazur distance to the Cube.
- 2008-2009 **Master in pure mathematics: First year**, *Université Pierre et Marie Curie- Paris VI*, Highest honors.
Research project under the supervision of Gilles Godefroy.
Title: Existence and uniqueness of preduals of Banach spaces.
- 2005-2008 **BS in mathematics**, *Lebanese University- Faculty of Science II*, Highest honors.

Teaching experience

- 2015- **Teaching duties at Paris VII and ENS Cachan**, *4-5 courses per year*.
Regular second and third year probability courses, topic course around concentration inequalities at ENS Cachan.
- 2013-2015 **Instructor for BS degree**, *University of Alberta*.
Courses: Calculus I, Calculus III.
- 2010-2013 **Instructor for BS degree**, *Université Paris-Est Marne-la-Vallée*.
Courses: Algebra 2, Analysis 1, Calculus, methodology of mathematics.
- 2005-2014 **Private courses for undergraduate students**.

Papers

- **Restricted invertibility and the Banach-Mazur distance to the Cube**, *Mathematika* 60 (2014), no. 1, 201-218.
- **A note on column subset selection**, *International Mathematical Research Notices*, 2014(23):6431-6447, 2014.

- **Estimating the covariance of random matrices**, *Electronic journal of Probability*, Vol 18, no.107, 1-26.
- **Extracting a basis with fixed block inside a matrix**, *Linear Algebra and Its Applications*, 469(Complete):28–38, 2015..
- **When does a discrete-time random walk in $\mathbb{R}^n$ absorb the origin into its convex hull?** (Joint with K. Tikhomirov) , *Ann. Probab.* 45 (2017), no. 2, 965-1002.
- **Bernstein type inequality for a class of dependent random matrices** (Joint with M. Banna and F. Merlevède), *Random Matrices Theory Appl.* 5 (2016), no. 2, 1650006, 28 pp.
- **Anti-concentration property for random digraphs and invertibility of their adjacency matrices** (Joint with A. Lytova, A. Litvak, K. Tikhomirov and N. Tomczak-Jaegermann), *C.R. Math. Acad. Sci. Paris*, 354 (2016), 121–124.
- **Adjacency matrices of random digraphs: singularity and anti-concentration** (Joint with A. Lytova, A. Litvak, K. Tikhomirov and N. Tomczak-Jaegermann), *J. of Math. Analysis and Appl.*, 445 (2017), 1447–1491.
- **Restricted invertibility revisited** (Joint with A. Naor), *accepted in Journey Through Discrete Mathematics. A Tribute to Jiri Matousek.*, available at arXiv:1601.00948.
- **Approximating matrices and convex bodies** (Joint with O. Friedland), *accepted in International Mathematical Research Notices*, available at arXiv:1605.03861.
- **On the norm of a random jointly exchangeable matrix** (Joint with K. Tikhomirov), available at arXiv:1610.01751.
- **The spectral gap for dense random regular graphs** (Joint with K. Tikhomirov), *submitted*, available at arXiv:1610.01765.
- **The smallest singular value of a shifted d -regular random square matrix** (Joint with A. Lytova, A. Litvak, K. Tikhomirov and N. Tomczak-Jaegermann), *submitted*, available at arXiv:1707.02635.
- **The dimension-free structure of nonhomogeneous random matrices** (Joint with R. Latała and R. Van Handel), *submitted*, available at arXiv:1711.00807.
- **Random d -regular graphs I: structure of the kernel** (Joint with A. Lytova, A. Litvak, K. Tikhomirov and N. Tomczak-Jaegermann), *in preparation*.
- **Random d -regular graphs II: the circular law** (Joint with A. Lytova, A. Litvak, K. Tikhomirov and N. Tomczak-Jaegermann), *in preparation*.

Conference talks

- October 2012 **Distance de Banach-Mazur au Cube**, Université Paris-Est Marne-la-Vallée , France.
Journées du GdR "Analyse Fonctionnelle, Harmonique et Probabilités" 2012.
- April 2013 **Estimating the distance to the cube through the restricted invertibility principle**,
Lebanese American University, Lebanon.
LAAS International Science Conference.
- October 2013 **A short proof for an upper bound of the Banach-Mazur distance to the cube**,
Washington University, Saint-Louis, USA.
AMS fall central sectional meeting.
- March 2014 **Almost orthogonal contact points**, BIRS, Canada.
Geometric Tomography and Harmonic Analysis.
- June 2014 **On some column selection problems and applications**, Lebanon.
LSMS annual meeting.
- August 2014 **Extracting a well conditioned submatrix and the paving conjecture**, *Short communication in the International Congress of Mathematics*, Seoul-Korea.

- October 2014 **Gordon's escape Theorem and convex hull of a brownian motion**, *University of Michigan, USA*.
Informal analysis seminar.
- October 2014 **Minimizing the Hilbert-Schmidt norm of the inverse of submatrices**, *San Francisco state university, USA*.
AMS western central sectional meeting.
- October 2015 **Expansion and anti-concentration properties of random digraphs**, *Université Paris-Est Marne-La-Vallée , France*.
Convexity, probability and discrete structures, a geometric view point.
- December 2015 **Bernstein inequality: Non-commutative setting and dependence**, *CIRM, France*.
Journées du GdR "Analyse Fonctionnelle, Harmonique et Probabilités" 2015.
- January 2016 **Invertibility of the adjacency matrix of a random digraph**, *CIRM, France*.
Spectrum of Random Graphs.
- May 2016 **Revisiting the restricted invertibility principle**, *Lebanese University, Lebanon*.
Journées d'analyse de Beyrouth.
- May 2016 **Restricted invertibility revisited**, *University of Alberta, Canada*.
Conference on Geometric Functional Analysis in Honour of Nicole Tomczak-Jaegermann.
- June 2016 **Reducing the number of contact points of a convex body**, *Euler institute, Saint-Petersburg, Russia*.
Asymptotic Geometric Analysis III.
- July 2016 **Constraint approximation and contact points of a convex body**, *Texas A&M university, USA*.
Concentration Week on Geometric Functional Analysis.
- October 2016 **Spectral gap for the uniform model in the dense regime**, *Institut de Mathématique de Toulouse, France*.
Journées du GdR "Analyse Fonctionnelle, Harmonique et Probabilités" 2016.
- April 2017 **Spectral gap for the uniform model in the dense regime**, *ENS Lyon, France*.
ProbabLY ON random matrices.

Seminar talks

- July 2009 **Existence et unicité des préduaux des espaces de Banach**, *Lebanese University- Faculty of science II, Lebanon*.
- October 2011 **Introduction au problème de la distance de Banach-Mazur au cube**, *Université Paris-Est Marne-la-Vallée , France*.
Séminaire des Thésards.
- May 2012 **Restricted invertibility: Past and Present**, *University of Athens , Greece*.
- October 2012 **Generalisation du principe d'invertibilité restreinte**, *Université Paris-Est Marne-la-Vallée , France*.
Séminaire des Thésards.
- January 2013 **On Column selection problems**, *Université Pierre et Marie Curie-Paris VI, France*.
Séminaire d'analyse fonctionnelle.
- March 2013 **Restricted invertibility and distance to the cube**, *Kent State University, USA*.
Measure theory seminar.
- March 2013 **On some column selection problems and applications**, *University of Michigan, USA*.
Analysis/Probability Learning Seminar.
- May 2013 **Sélection d'un bloc bien conditionné dans une matrice**, *Université Lille 1, France*.
Séminaire d'analyse fonctionnelle.
- June 2013 **Estimation de la covariance de matrices aléatoires**, *Université Paris-Est Marne-la-Vallée, France*.
Groupe de travail ASPRO.

- June 2013 **Sélection d'un bloc bien conditionné dans une matrice**, *Institut de Mathématiques de Bordeaux*, France.
Séminaire d'analyse.
- September 2013 **On the distance to the cube**, *University of Alberta*, Canada.
Analysis working seminar.
- October 2013 **Selecting a well-conditioned block inside a matrix**, *University of Columbia- Missouri*, USA.
Analysis seminar.
- November 2013 **The local Lemma and coloring of Hypergraphs**, *University of Alberta*, Canada.
Analysis working seminar.
- November 2013 **Selecting a well-conditioned block inside a matrix**, *University of British Columbia*, Canada.
Analysis seminar.
- May 2014 **The restricted invertibility principle and estimating the distance to the cube**, *University of Kiel*, Germany.
Analysis seminar.
- May 2014 **Towards a deterministic algorithm for the Kadison-Singer problem**, *University of Kiel*, Germany.
Colloquium.
- June 2014 **Distance au Cube à travers l'invertibilité restreinte**, *Saint-Joseph university*, Lebanon.
- October 2014 **Extracting a well conditioned submatrix and the paving conjecture**, *University of California San Diego*, USA.
- April 2015 **The paving problem and the Banach-Mazur distance to the cube**, *American university of Beirut*, Lebanon.
- May 2015 **Analogue ℓ_1 de Dvoretzky et le problème de Kadison-Singer**, *Université de Franche-Comté*, France.
Séminaire d'analyse fonctionnelle.
- October 2015 **Enveloppe convexe du mouvement Brownien et théorème "d'escape" de Gordon**, *Université Paris Diderot*, France.
Groupe de travail modélisation.
- November 2015 **Marches aléatoires à temps discret et le théorème "d'escape" de Gordon**, *Université Pierre et Marie Curie-Paris VI*, France.
Séminaire d'analyse fonctionnelle.
- November 2015 **Marches aléatoires à temps discret et le théorème "d'escape" de Gordon**, *Université Paris Sud, Orsay*, France.
Séminaire d'analyse Harmonique.
- November 2015 **Enveloppe convexe du mouvement Brownien et théorème "d'escape" de Gordon**, *Université Lille 1*, France.
Séminaire d'analyse fonctionnelle.
- January 2016 **Invertibility of the adjacency matrix of a random digraph**, *Institut Henri Poincaré*, France.
Groupe de travail Matrices et Graphes aléatoires.
- February 2016 **Enveloppe convexe du mouvement Brownien et théorème "d'escape" de Gordon**, *Université Paris Dauphine*, France.
Séminaire d'analyse-Probabilité.
- March 2016 **Inversibilité de la matrice d'adjacence d'un digraphe aléatoire**, *Université Pierre et Marie Curie-Paris VI*, France.
Séminaire du LPMA.
- November 2016 **Enveloppe convexe du mouvement Brownien et théorème "d'escape" de Gordon**, *Université de Rouen*, France.
Groupe de travail "Probabilités, Théorie Ergodique et Systèmes Dynamique".

- December 2016 **Spectral gap for the uniform model in the dense regime**, *American university of Beirut*, Lebanon.
- December 2016 **Concentration inequalities and the spectral gap of large random graphs**, *Lebanese University- Faculty of science II*, Lebanon.
Mini course of 9 hours.
- January 2017 **Trou spectral pour le modèle uniforme dans le régime dense**, *Université Pierre et Marie Curie-Paris VI*, France.
Séminaire d'analyse fonctionnelle.
- May 2017 **Trou spectral pour le modèle uniforme dans le régime dense**, *Université Nice Sophia-Antipolis*, France.
Séminaire de Probabilité et Statistiques
- Nov 2017 **Spectral gap of random graphs**, *MSRI*, USA.
Postdoc seminar

Awards and grants

- 2005-2008 **Awards of excellence delivered by the Lebanese University**, for being ranked first in all Bachelor courses.
- 2008-2010 **Bourse Master Ile-De-France** delivered by conseil régional d'Ile-De-France.
- 2010-2013 **Doctoral contract** delivered by the doctoral school of Paris-Est.
- 2011-2012 **International mobility grant** obtained from the doctoral school of Paris-Est, to visit Professor Apostolos Giannopoulos at the University of Athens from May 5 till June 17.
- 2013-2015 **PIMS/CNRS Post-Doctoral Fellowship**, for a Post-Doctoral position at the University of Alberta.
- 2014 **NANUM 2014 Travel Grant**, to participate in SEOUL ICM 2014.
- 2014 **Prix de Thèse UPE**, prize awarded by Paris-Est University for the best PhD of the doctoral school of Mathematics, Computer Science, Information and Communication sciences.
- 2016 **Projet Exploratoire Premier Soutien (PEPS)**, a small personal grant of 3000 Euros delivered by CNRS, France.
- 2016-2020 **ANR SAMARA**, joint grant (~ 175000 euros) with Charles Bordenave, Marc Lelarge and Justin Salez to work on Spectrum, Algorithms and random walks in random networks.

Services to community

- 2017- **Co-organizer of the weekly working seminar "Modélisation Stochastique"** in Université Paris Diderot.
- Aug-Dec 2017 **Co-organizer of the weekly Young Researchers Seminar** in the GFA program at MSRI.
- 2011-2013 **Representative of the PhD students** at the doctoral school of Paris-Est.
Reviewer for: *Journal of Functional Analysis*, *SIAM journal of Matrix Analysis and Applications*, *Linear Algebra and its Applications*, *Electronic Communications in Probability*, *ESAIM: Probability and Statistics*,.

Other

Citizenship, Lebanese, Born on 26 september 1987 at Haret Sakher in Lebanon.

Language, Arabic (native language) , French (fluent), English (fluent).

Various, With Karam Fayad, I am the author of "A vos marques, Prets, Pensez", a book on logic puzzles.