Krzakala Florent

Researcher unique identifiers: Arxiv ,Google scholar, ORCID
Date of birth: 22/03/1976 Nationality: French Web site: krzakala.org

•EDUCATION

2011 Habilitation, Université Paris 6 UPMC
2002 PhD thesis, Université Paris 11 Orsay
1999 Master Physics, Université Paris 11 Orsay

•CURRENT POSITION(S)

2013 – Professor, Sorbonne Université (ex UPMC) & Ecole Normale Supérieure, Paris
2016 – Holder of the Chaire ENS-CFM on data science in Ecole Normale Supérieure, Paris

•PREVIOUS POSITIONS

2004-2013 Associate professor in Ecole Supérieure de Physique et Chimie ESPCI Paris, France
2002-2004 Post-doc in the group of Prof. Parisi @ Universita di Roma La Sapienza, Italy

•MAJOR INVITED POSITION ABROAD

Spring 2019 Invited Research @ KITP Santa Barbara USA
Spring 2018 Invited Prof. semester @ Duke University, USA, Mathematics Department
Spring 2016 Invited Research semester @ Berkeley University, USA, Simons Institute for Computing
2008 & 2009 Invited Research semester @ Los Alamos Nat. Lab. CNLS, New Mexico, USA

•FELLOWSHIPS AND AWARDS

2018 Prix Atos-Joseph Fourier 2018 in Artificial Intelligence
2015 Member of the Institut Universitaire de France, Paris
2012 - 2017 PI ERC Consolidator grant project SPARCS 307087

•RESEARCH INTERESTS

* Statistical Learning * Machine learning & neural networks * Inverse problems on graphs * Statistical physics of disordered systems * Quantum Phase Transitions * Constraint Optimisation Problems * Error correction & Information theory * Computational Optics

•PUBLICATION TRACK

More than hundred articles in peer-reviewed international journals and conference proceedings with **5250+** citations on Google Scholar (GS). My **h-index is 40** as of 31/6/2018, and my i10-index is 92 (80 including publications in the last 5 years). Publications in major journals in physics (*Phys. Rev. Lett.*), Information Theory (*IEEE trans. information theory*), mathematics (*Advances in mathematics*) and high impact general journals (*Proc. Nat. Acad. Sci.)*. Publications in the most selective conferences in machine learning (*NIPS, ICML*), statistical learning theory (*COLT*), computer science (*STOC*), Information theory (*ISIT, ITA, ITW*) and signal processing (*ICASPP*).

INVITED PRESENTATION TO CONFERENCE, SCHOOLS AND UNIVERSITIES

I have given more than a **100 seminars at universities, conferences and workshops internationally**. In particular, I have been invited to speak in a number of major universities and research centers in physics, mathematics, computer science, electrical engineering, or statistics departments: Princeton, Berkeley, Rudgers, Harvard, MIT, Chicago, Duke, Los Alamos, Santa Fe, New York Univ., ICTP Trieste, Rome, ETH Zurich, EPFL Lausanne, Cambridge, Tokyo, etc. I have also presented my work in over **80 international conferences** in physics, computer science and applied mathematics. I was also often invited to universities and foreign research organisations to spend periods of one month (Trieste, Torino, Beijing, Santa Fe, Boulder, EPFL) to a full semester (Los Alamos, Berkeley, Duke, KITP Santa Barbara).

Recent notable invited conference, keynotes and lectures are

- **Big Data 2015** in **Harvard** Univ., Cambridge, Massachusetts (U.S.A.), Aug 2015 **[video link]**
- Keynote speaker at the **GRETSI 2015** congress in Lyon on signal processing **[video link]**
- **05/2016** Seminar in Simons Institute @ UC Berkeley **[video link]**
- **07/2017** Lectures series *Statistical mechanics, Glasses & Inference* @ UC Boulder (Colorado)**[video link]**
- **09/2017** Lectures series *Physics, Statistics & Machine Learning* @ EPFL Lausanne
- **1-4/2018** Lectures series *Statistical physics of Learning* @ Duke University, USA **[course link]**
- **STOC 2018**: Symposium on theory on computing, workshop, Los Angeles 2018
- **ICMP 2018**: International Conference on Mathematical Physics, Montreal 2018

•SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

Many of my post-docs and students team have obtained academic positions in universities…

* Jean Barbier ***Phd*** 2012-2015, lecturer @ *Queen Mary University of London*
* Angelique Dremeau ***Post-doc*** 2014, Assistant professor @ *ENSTA Bretagne*.
* Sun Yifan ***Phd*** 2012, lecturer @ *Renmin University of China, Beijing*.
* Boshra Rajaei ***Postdoc*** 2015, assistant professor @ *Sadjad University of Technology, Iran*.
* Pan Zhang ***Postdoc*** 2012-2013, associate professor @ *Inst. of Theoretical Physics in Beijing.*
* Alejandro Lage-Castellanos ***Postdoc*** 2016-2017, associate professor @*University of Havana*, Cuba.

... as well as research positions in world leading tech companies ….

* Christophe Schülke ***Phd*** student 2012-2016, @ *Philips research* (Hamburg, Germany)
* Francesco Caltagirone ***Postdoc*** 2015, @ *Huawei research* (Paris, France)

… in dynamic start-ups at the forefront of AI …

* Alaa Saade, ***Phd*** student 2012-2016, now researcher scientist @SNIPS https://snips.ai/
* Eric Tramel, ***Post-doc*** 2012-2016, now researcher scientist @OWKIN http://owkin.com/
* Andre Manoel, ***Post-doc*** 2014-2017, now researcher scientist @OWKIN http://owkin.com/

… or are currently pursuing post-docs in major universities:

* Matthieu Hemery ***Phd*** student 2012-2015 now @ *McGill* (Canada)
* Laura Foini, ***Post-doc*** 2016-2017, now @ Theoretical Physics in ENS

Current team:

- Alia Abarra, Jonathan Dong, Antoine Maillard, Marylou Gabrie
- Postdoc: Antoine Baker

•TEACHING ACTIVITIES

Courses as university professor on physics, mathematics, computer science and machine learning in ***Sorbonne Universités***, (ex-UPMC) Paris 6 (since 2013), ***Ecole Normale Supérieure*** Paris (since 2013) and ***ESPCI Paris*** (2004-2014). I gave invited lectures in a number of *summer schools* internationally, in USA (Aspen, Boulder, Berkeley…) China (Beijing), India (Bangalore), Italy (Trieste) and France (Les Houches). I also taught invited long lectures in statistical inference and computer science in international universities, e.g. **EPFL in Lausanne**, **Tokyo University** in Japan & **Duke University** in USA. I also taught Machine Learning for private companies, such as Capital Fund Management.

•ORGANISATION OF SCIENTIFIC MEETINGS

7 international conferences and 4 international schools

- In prep. (2020): 1 month school on *Theory of Machine learning* (~70 participants) in Les Houches
- 8/2018: *Statistics physics and machine learning* (~100 participants) in Cargese **[link]**
- 2/2017: *Statistical physics, Learning, Inference and Networks*, Les Houches ~70 participants**[link]**
- 6/2016 : *Physics methods in biology & computer science, Sat. of StatPhys2016,* in ENS, ~100 parts **[link]**
- 8/2014 : 2 weeks School on *Spin glasses,* (~100 participants) in Cargese (Corsica) **[link]**
- 9/2013 : School on *Optimization & message passing* (~70 participants) Les Houches **[link]**
- 2/2012: *Bridging Stat. physics, optimization, inference & learning*, Les Houches ~70 participants
- 12/2011 : *Disordered systems and the Jamming Transition,* IHP Paris, ~70 participants **[link]**
- 6/2011: *Conference on Physics and Biological Systems*, Orsay ~50 participants
- 11/2010: *Statistical Physics of Complexity, & Biological information,* Orsay ~50 participants
- 7-12/32010 : 1 week school *Stat. Phys. of Biological information* (~70 participants) Les Houches

•INSTITUTIONAL RESPONSIBILITIES & REVIEWING ACTIVITIES

2018 -	Member of the MIT International Science and Technology Initiatives Committee
2018 –	Editorial Board, *Journal of Statistical Mechanics* / IOP Publishing
2016 –	Organizer of the data science colloquium in Ecole Normale: **link: youtube channel**
2016 –	Scientific Advisory Board and cofounder in **LightOn Inc**
2015–2017	Editorial Board, Scientific Report/ Nature Publishing
2013	Scientific Evaluation (HCERS), University of Grenoble/ France

Reviewer for physics journals (Nature, *PNAS*, Physical Review,…) as well as in machine learning & computer science conferences (ICML, NIPS, ICLR, ISIT, RANDOM, IASTAT, COLT,…). Reviewer for grant agencies, including ERC starters & advanced grants in panels PE2, PE6 & PE7, and French Agence Nationale de la Recherche (ANR).

I have been a member of 12 Ph.D and Habilitation committees, including 5 times as the president of the Jury

Publications list

- ***Books, and long reviews***

I have written two long reviews on different aspects of my research:

[1] **Statistical physics of inference: Thresholds and algorithms** [link]
Lenka Zdeborová, Florent Krzakala Advances in Physics Volume 65, 5 (2016)

[2] **The Quantum Adiabatic Algorithm applied to random optimization problems: the quantum spin glass perspective** [link]
V. Bapst, L. Foini, F. Krzakala, G. Semerjian, F. Zamponi Physics Reports 523, 127 (2013)

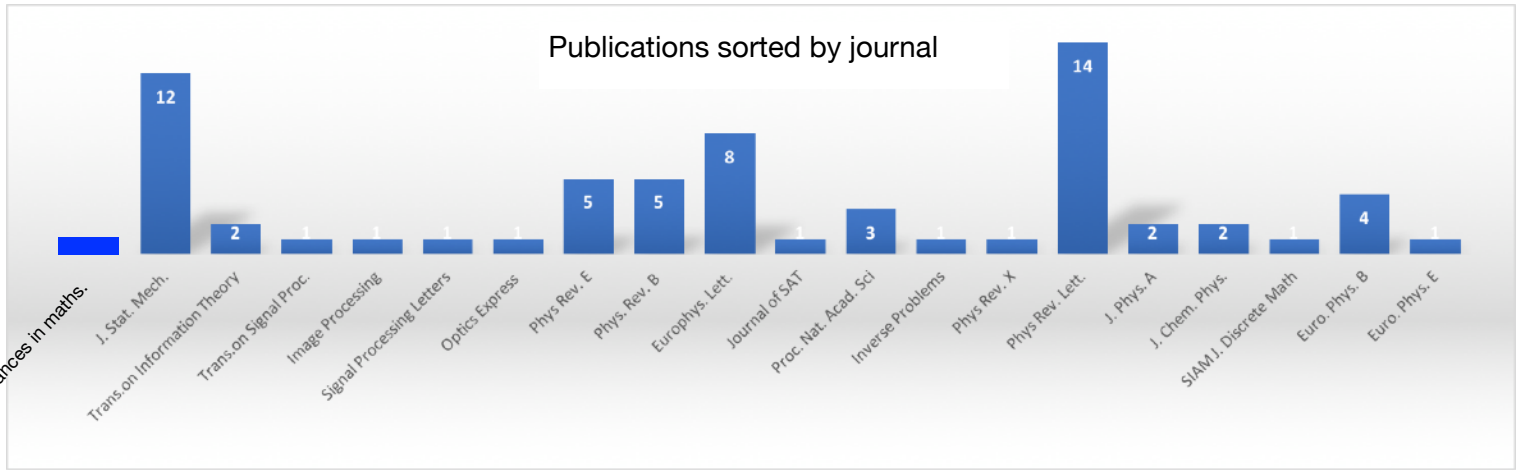
I also edited the lecture notes of the Les Houches school I organised in 2013

[3] **Statistical Physics, Optimization, Inference, and Message-Passing Algorithms: Lecture Notes of the Les Houches School of Physics** [link]: by F. Krzakala, F. Ricci-Tersenghi, L. Zdeborova, R. Zecchina , Eric W. Tramel and Leticia F. Cugliandolo Oxford publishing (2013)

I participated to one chapter of the Les Houches school I participated in, in 2002

[4] **Hiking through glassy phases: physics beyond aging** [link]
L. Berthier, V. Viasnoff, O. White, V. Orlyanchik, F. Krzakala, Lecture notes, Les Houches, July 2002 in "Slow relaxations and nonequilibrium dynamics in condensed matter"; Eds: J.-L. Barrat, J. Dalibard, M. Feigelman, J. Kurchan (Springer, Berlin, 2003)

- ***Publications in international peer reviewed journals***



[1] **Information-theoretic thresholds from the cavity method [link]**
A. Coja-Oghlan, F. Krzakala, W. Perkins, L. Zdeborova,
Advances in Mathematics Volume 333, 31 July 2018, Pages 694-795

[2] **Constrained Low-rank Matrix Estimation: Phase Transitions, Approximate Message Passing and Applications [link]**
T. Lesieur, F. Krzakala & L. Zdeborova J. Stat. Mech. 7 (2017) 073403

[3] **Approximate message-passing decoder and capacity-achieving sparse superposition codes [link]** J. Barbier & F. Krzakala IEEE Transactions on Information Theory, 63, 8 (Aug. 2017)

[4] **Spectral Bounds for the Ising Ferromagnet on an Arbitrary Given Graph [link]**
Alaa Saade, Florent Krzakala, Lenka Zdeborová J. Stat. Mech. 2017 053403

[5] **Performance Limits for Noisy Multi-Measurement Vector Problems [link]**
J. Zhu, D. Baron, F. Krzakala IEEE Transactions on Signal Processing, 65, 9,2444 - 2454 (2017)

[6] **Robust phase retrieval with the swept approximate message passing algorithm [link]**
B. Rajaei, S. Gigan, F. Krzakala, L. Daudet Image Processing On Line, 7 (2017), pp. 43-55

[7] **Fast phase retrieval for high dimensions: A block-based approach [link]**
B. Rajaei, S. Gigan, F. Krzakala, L. Daudet IEEE Signal Processing Letters 23, 1179 - 1182 (2016)

[8] **Phase transitions and sample complexity in Bayes-optimal matrix factorization [link]**
Y. Kabashima, F. Krzakala, M. Mézard, A. Sakata, L. Zdeborová
IEEE Transactions on Information Theory (Volume:62 , Issue: 7, Pages: 4228 - 4265) 2016

[9] **Approximate Message Passing with Restricted Boltzmann Machine Priors [link]**
E. W. Tramel, A. Drémeau and F. Krzakala J. Stat. Mech. (2016) 073401

[10] **Approximate message-passing with spatially coupled structured operators, with applications to compressed sensing and sparse superposition codes [link]**
J. Barbier, C. Schülke, F. Krzakala J. Stat. Mech. (2015) P05013

[11] **Reference-less measurement of the transmission matrix of a highly scattering material using a DMD and phase retrieval techniques [link]**
A. Dremeau, A. Liutkus, D. Martina, O. Katz, C. Schulke, F. Krzakala, S. Gigan, L. Daudet
Optics Express Vol. 23, Issue 9, pp. 11898-11911 (2015)

[12] **Belief-Propagation Guided Monte-Carlo Sampling [link]**
A. Decelle & F. Krzakala Phys. Rev. B 89, 214421 (2014)

[13] **Spectral density of the non-backtracking operator [link]**
A. Saade, F. Krzakala & L. Zdeborova 2014 EPL 107 50005

[14] **Reweighted belief propagation and quiet planting for random K-SAT [link]**
F. Krzakala, M. Mézard & L. Zdeborova J. on Satisfiability, Boolean Mod. & Computation 8 (2014)

[15] **Model Selection for Degree-corrected Block Models**
X. Yan, C. Rohilla Shalizi, J. E. Jensen, F. Krzakala, C. Moore, L. Zdeborova, P. Zhang, Y. Zhu
J. Stat. Mech. (2014) P05007

[16] **Spectral redemption: clustering sparse networks [link]**
F. Krzakala, C. Moore, E. Mossel, J. Neeman, A. Sly, F. Zdeborová, P. Zhang
Proceedings of the National Academy of Sciences 110, no. 52 (2013)

[17] **Belief Propagation Reconstruction for Discrete Tomography [link]**
E. Gouillart, F. Krzakala, M. Mezard & L. Zdeborová Inverse Problems 29, 3 (2013) 035003

[18] **Fragility and hysteretic creep in frictional granular jamming [link]**
M. M. Bandi, M. K. Rivera, F. Krzakala, R. E. Ecke Phys. Rev. E 87, 042205 (2013)

[19] **Ultrametric probe of the spin-glass state in a field [link]**
H. G. Katzgraber, T. Jorg, F. Krzakala, A. K. Hartmann Phys. Rev. B 86, 184405 (2012)

[20] **Comparative Study for Inference of Hidden Classes in Stochastic Block Models [link]**
P. Zhang, F. Krzakala, J. Reichardt & L. Zdeborová J. Stat. Mech. (2012) P12021

[21] **Probabilistic Reconstruction in Compressed Sensing: Algorithms, Phase Diagrams, and Threshold Achieving Matrices [link]**
F. Krzakala, M. Mézard, F. Sausset, Y. Sun, L. Zdeborová J. Stat. Mech. (2012) P08009

[22] **Statistical physics-based reconstruction in compressed sensing [link]**
F. Krzakala, M. Mézard, F. Sausset, Y. Sun, L. Zdeborová Phys. Rev. X 2, 021005 (2012)

[23] **On the relation between kinetically constrained models of glass dynamics and the random first-order transition theory [link]**
Laura Foini, Florent Krzakala, Francesco Zamponi J. Stat. Mech. (2012) P06013

[24] **Following states in temperature in the spherical s+p-spin glass model [link]**
Y. Sun, A. Crisanti, F. Krzakala, L. Leuzzi, L. Zdeborová J. Stat. Mech. (2012) P07002

[25] **The nature of the different zero-temperature phases in discrete two-dimensional spin glasses: Entropy, universality, chaos and cascades in the renormalization group flow [link]**
Thomas Jörg and Florent Krzakala J. Stat. Mech. (2012) L01001
Special insight on this paper in J. Phys. A by A. Hartmann [link]

[26] **Asymptotic analysis of the stochastic block model for modular networks and its algorithmic applications [link]**
A. Decelle, F. Krzakala, C. Moore, F. Zdeborová Phys. Rev. E 84, 066106 (2011)

[27] **Phase transition in the detection of modules in sparse networks [link]**
A. Decelle, F. Krzakala, C. Moore, F. Zdeborová Phys. Rev. Lett. 107, 065701 (2011)

[28] **Random-field p-spin glass model on regular random graphs [link]**
Y. Matsuda, H. Nishimori, L. Zdeborová, F. Krzakala J. Phys. A: Math. Theor. 44 (2011) 185002

[29] **Glassy dynamics as a melting process** [link]
F. Krzakala & L. Zdeborova, J J. Chem. Phys. 134, 034513 (2011)

[30] **Glassy aspects of melting dynamics** [link]
F**.** Krzakala & L. Zdeborova, J. Chem. Phys. 134, 034512 (2011)

[31] **No spin glass phase in ferromagnetic random-field random-temperature scalar Ginzburg-Landau model** [link]
F. Krzakala, F. Ricci-Tersenghi, D. Sherrington, L. Zdeborová J. Phys. A:. 44, 042003 (2011)
Special insight on No spin glass phase in the random field Ising model in J. Phys. A [link]

[32] **Quiet Planting in the Locked Constraint Satisfaction Problems** [link]
Lenka Zdeborová, Florent Krzakala SIAM J. Discrete Math. 25, 750-770 (2011)

[33] **First-order transitions and the performance of quantum algorithms in random optimization problems** [link]
T.Jorg, F.Krzakala, G.Semerjian, F.Zamponi Phys. Rev. Lett. 104, 207206 (2010)

[34] **Following Gibbs States Adiabatically - The Energy Landscape of Mean Field Glassy Systems** [link] F. Krzakala & L. Zdeborova 2010 EPL 90 66002

[35] **Inference in particle tracking experiments by passing messages between images** [link] M. Chertkov, L. Kroc, F. Krzakala, M. Vergassola, L. Zdeborová Proc. Nat. Acad. Sci. 107:7663,2010

[36] **Elusive Glassy Phase in the Random Field Ising Model** [link]
F. Krzakala, F. Ricci-Tersenghi, D. Sherrington, L. Zdeborová Phys. Rev. Lett. 104, 207208 (2010)

[37] **Generalization of the cavity method for adiabatic evolution of Gibbs states** [link]
Lenka Zdeborová and Florent Krzakala Phys. Rev. B 81, 224205 (2010)
Editors' Suggestion in Phys. Rev. B

[38] **Energy gaps in quantum first-order mean-field-like transitions: The problems that quantum annealing cannot solve** [link]
T. Jorg, F. Krzakala, J. Kurchan, A. C. Maggs, J. Pujos EPL, 89 (2010) 40004

[39] **Hiding Quiet Solutions in Random Constraint Satisfaction Problems** [link]
Lenka Zdeborová and Florent Krzakala Phys. Rev. Lett. 102, 238701 (2009)

[40] **Jamming versus Glass Transitions** [link]
Romain Mari, Florent Krzakala, and Jorge Kurchan Phys. Rev. Lett. 103, 025701(2009)

[41] **On the path integral representation for quantum spin models and its application to the quantum cavity method and to Monte Carlo simulations** [link]
F. Krzakala, A. Rosso, G. Semerjian, F. Zamponi Phys. Rev. B 78, 134428 (2008)

[42] **A Lattice Model for Colloidal Gels and Glasses** [link]
Florent Krzakala, Marco Tarzia, Lenka Zdeborová Phys. Rev. Lett. 101, 165702 (2008)

[43] **Simple Glass Models and their Quantum Annealing** [link]
Thomas Jorg, Florent Krzakala, Jorge Kurchan, A. C. Maggs Phys. Rev. Lett. 101, 147204 (2008)

[44] **Behavior of Ising Spin Glasses in a Magnetic Field** [link]
Thomas Jorg, Helmut G. Katzgraber, Florent Krzakala Phys. Rev. Lett. 100, 197202 (2008)

[45] **Potts Glass on Random Graphs** [link]
Florent Krzakala & Lenka Zdeborova EPL, 81 (2008) 57005

[46] **Comment on « Ultrametricity in the Edwards-Anderson Model »** [link]
Thomas Jorg, Florent Krzakala Phys. Rev. Lett. 100, 159701 (2008)

[47] **Phase Transitions in the Coloring of Random Graphs** [link]
Lenka Zdeborová and Florent Krzakala Phys. Rev. E 76, 031131 (2007)

[48] **A Landscape Analysis of Constraint Satisfaction Problems** [link]
Florent Krzakala and Jorge Kurchan Phys. Rev. E 76, 021122 (2007)

[49] **Gibbs States and the Set of Solutions of Random Constraint Satisfaction Problems** [link]
F. Krzakala, A. Montanari, F. Ricci-Tersenghi, G. Semerjian, L. Zdeborova
Proc. Natl. Acad. Sci. 104, 10318 (2007)

[50] **Temperature and Disorder Chaos in Three-Dimensional Ising Spin Glasses** [link]
Helmut G. Katzgraber, Florent Krzakala Phys. Rev. Lett. 98, 017201 (2007)

[51] **Critical aging of Ising ferromagnets relaxing from an ordered state** [link]
P. Calabrese, A. Gambassi, F. Krzakala J.Stat.Mech.0606:P06016,2006

[52] **Disorder chaos in spin glasses** [link]
F. Krzakala and J.P. Bouchaud Europhys. Lett., 72 (3), pp. 472-478 (2005)

[53] **Spin glass models with ferromagnetically biased couplings on the Bethe lattice: analytic solutions and numerical simulations** [link]
Tommaso Castellani, Florent Krzakala, Federico Ricci-Tersenghi. Eur. Phys. J. B 47, 99 (2005)

[54] **Glassy properties of the Kawasaki dynamics of two-dimensional ferromagnets** [link]
Florent Krzakala Phys. Rev. Lett. 94, 077204 (2005)

[55] **Threshold values, stability analysis and high-q asymptotics for the coloring problem on random graphs** [link]
Florent Krzakala, Andrea Pagnani, Martin Weigt Phys. Rev. E 70, 046705 (2004)

[56] **Nonequilibrium critical dynamics of the ferromagnetic Ising model with Kawasaki dynamics** [link]
C. Godreche, F. Krzakala & F. Ricci-Tersenghi J.Stat. Mech.: Theor. Exp. (2004) P04007

[57] **On temperature chaos in Ising and XY Spin Glasses** [link]
Florent Krzakala Europhys. Lett., 66 (6), pp. 847-853 (2004)

[58] **Energy exponents and corrections to scaling in Ising spin glasses** [link]
J.-P. Bouchaud, F. Krzakala, O.C. Martin Phys. Rev. B 68, 224404 (2003)

[59] **Local excitations in mean field spin glasses** [link]
F. Krzakala and G. Parisi Europhys. Lett., 66 (5), pp. 729-735 (2004)

[60] **Absence of an equilibrium ferromagnetic spin glass phase in three dimensions** [link]
F. Krzakala, O.C. Martin Phys. Rev. Lett. 89, 267202 (2002)

[61] **The secondary structure of RNA under tension** [link]
M. Mueller, F. Krzakala, M. Mezard Eur. Phys. J. E 9, 67-77 (2002)

[62] **Chaotic temperature dependence in a model of spin glasses** [link]
F. Krzakala, O.C. Martin Eur. Phys. J. B 28, 199-209 (2002)

[63] **Nature of the glassy phase of RNA secondary structure** [link]
F. Krzakala, M. Mezard, M. Mueller Europhys. Lett., 57 (5), pp. 752-758 (2002)

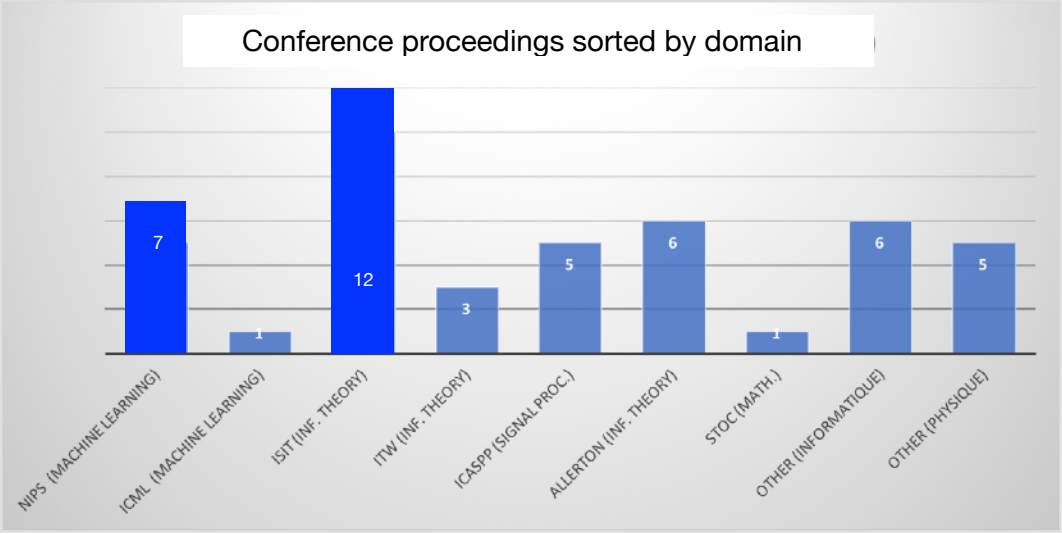
[64] **Zero-temperature responses of a 3D spin glass in a field** [link]
F. Krzakala, J. Houdayer, E. Marinari, O.C. Martin, G. Parisi Phys. Rev. Lett. 87, 197204 (2001)

[65] **Discrete energy landscapes and replica symmetry breaking at zero temperature** [link]
F. Krzakala, O.C. Martin Europhysics Letters 53 (6) (2001) 749-755

[66] **Large-scale low-energy excitations in 3-d spin glasses** [link]
J. Houdayer, F. Krzakala, O. C. Martin Eur. Phys. J. B 18, 467-477 (2000)

[67] **Spin and link overlaps in 3-dimensional spin glasses** [link]
F. Krzakala, O.C. Martin Phys. Rev. Lett. 85, 3013 (2000)

- ***Conference proceedings***



[1] **Entropy and mutual information in models of deep neural networks, [link]**
Marylou Gabrié, Andre Manoel, Clément Luneau, Jean Barbier, Nicolas Macris, Florent Krzakala, Lenka Zdeborová Accepted for publication (spotlight presentation) at NIPS 2018

[2] **The committee machine: Computational to statistical gaps in learning a two-layers neural network, [link]**
Benjamin Aubin, Antoine Maillard, Jean Barbier, Florent Krzakala, Nicolas Macris, Lenka Zdeborová Accepted for publication (spotlight presentation) at NIPS 2018

[3] **Estimation in the spiked Wigner model: A short proof of the replica formula [link]**
Ahmed El Alaoui, and Florent Krzakala
Information Theory (ISIT), 2018 IEEE International Symposium on, (2018)

[4] **The Mutual Information in Random Linear Estimation Beyond i.i.d. Matrices [link]**
Jean Barbier, Nicolas Macris, Antoine Maillard, Florent Krzakala
Information Theory (ISIT), 2018 IEEE International Symposium on, (2018)

[5] **Streaming Bayesian inference: theoretical limits and mini-batch approximate message-passing, [link]**
A. Manoel, F. Krzakala, E. W. Tramel, L. Zdeborová 2017 55th Annual Allerton Conference on Communication, Control, and Computing (Allerton), Monticello, IL, USA, p 1048-1055 (2017)

[6] **Decoding from Pooled Data: Phase Transitions of Message Passing [link]**
Ahmed El Alaoui, Aaditya Ramdas, Florent Krzakala, Lenka Zdeborova, Michael I. Jordan
Information Theory (ISIT), 2017 IEEE International Symposium on, Pages: 2780 - 2784 (2017)

[7] **Multi-Layer Generalized Linear Estimation [link]**
Andre Manoel, Florent Krzakala, Marc Mézard, Lenka Zdeborová
Information Theory (ISIT), 2017 IEEE International Symposium on, pages 2098-2102 (2017)

[8] **Statistical and computational phase transitions in spiked tensor estimation [link]**
Thibault Lesieur, Léo Miolane, Marc Lelarge, Florent Krzakala, Lenka Zdeborová
Information Theory (ISIT), 2017 IEEE International Symposium on, pp. 511-515. (2017)

[9] **Information-theoretic thresholds from the cavity method [link]**
A. Coja-Oghlan, F. Krzakala, W. Perkins, L. Zdeborova, In Proceedings of 49th Annual ACM SIGACT Symposium on the Theory of Computing, Montreal, Canada, June 2017 (STOC'17) (2017)

[10] **Fast Randomized Semi-Supervised Clustering [link]**
Alaa Saade, Florent Krzakala, Marc Lelarge, Lenka Zdeborová
To appear in International Meeting on "High-Dimensional Data-Driven Science" (HD^3-2017)

[11] **Phase transitions and optimal algorithms in high-dimensional Gaussian mixture clustering [link]** T. Lesieur, C. De Bacco, J. Banks, F. Krzakala, C. Moore, L. Zdeborová 2016 54th Annual Allerton Conference on Communication, Control, and Computing (Allerton) (2016)

[12] **The Mutual Information in Random Linear Estimation** [link]
Jean Barbier, Mohamad Dia, Nicolas Macris, Florent Krzakala 2016 54th Annual Allerton Conference on Communication, Control, and Computing (Allerton), Pages: 625 - 632
(2016)

[13] **Mutual information for symmetric rank-one matrix estimation: A proof of the replica formula** [link] Jean Barbier, Mohamad Dia, Nicolas Macris, Florent Krzakala, Thibault Lesieur, Lenka Zdeborova Advances in Neural Information Processing Systems 29 (NIPS 2016)

[14] **Inferring Sparsity: Compressed Sensing using Generalized Restricted Boltzmann Machines** [link] E.W. Tramel, A. Manoel, F. Caltagirone, M. Gabrié, F. Krzakala
IEEE Information Theory Workshop (ITW), Pages: 265 - 269 (2016)

[15] **Clustering from Sparse Pairwise Measurements** [link]
Alaa Saade, Marc Lelarge, Florent Krzakala, Lenka Zdeborová, Proceedings of the 2016 IEEE International Symposium on Information Theory (ISIT) Pages: 780 - 784 (2016)

[16] **Mutual Information in Rank-One Matrix Estimation** [link]
F. Krzakala, J. Xu, L. Zdeborová 2016 IEEE Information Theory Workshop (ITW), 71 - 75 (2016)

[17] **Intensity-only optical compressive imaging using a multiply scattering material and a double phase retrieval approach** [link]
B. Rajaei, E. W. Tramel, S. Gigan, F. Krzakala, L. Daudet, Proceedings of the 2016 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) pages: 4054 - 4058
(2016)

[18] **Matrix Completion from Fewer Entries: Spectral Detectability and Rank Estimation** [link] Alaa Saade, Florent Krzakala, Lenka Zdeborová
Advances in Neural Information Processing Systems (NIPS 2015) 28, pages 1261–1269 (2015)

[19] **Random Projections through multiple optical scattering: Approximating kernels at the speed of light** [link] A. Saade, F. Caltagirone, I. Carron, L. Daudet, A. Drémeau, S. Gigan, F. Krzakala Proc. of the 2016 IEEE Int. Conf. on Acoustics, Speech and Signal Proc. ICASSP
(2016)

[20] **MMSE of probabilistic low-rank matrix estimation: Universality with respect to the output channel** [link] Thibault Lesieur, Florent Krzakala, Lenka Zdeborová 2015 53rd Annual Allerton Conference on Communication, Control, and Computing, page 680 - 687,
(2015)

[21] **Scampi: a robust approximate message-passing framework for compressive imaging**
Jean Barbier, Eric W. Tramel, Florent Krzakala [link]
Presented at the 2015 International Meeting on High-Dimensional Data Driven Science, Kyoto, Japan, J. Phys.: Conf. Ser. 699 012013
(HD^3-2015)

[22] **Spectral Detection on Sparse Hypergraphs [link]**
Maria Chiara Angelini, Francesco Caltagirone, Florent Krzakala, Lenka Zdeborová 2015 53rd Annual Allerton Conference on Communication, Control, and Computing, pages 66 - 73, IEEE (2015)

[23] **Training Restricted Boltzmann Machines via the Thouless-Anderson-Palmer Free Energy [link]** Marylou Gabrié, Eric W. Tramel, Florent Krzakala
Advances in Neural Information Processing Systems (NIPS 2015) 28, pages 640–648. (2015)

[24] **Spectral Detection in the Censored Block Model [link]**
A. Saade, F. Krzakala, M. Lelarge, L. Zdeborová Information Theory (ISIT), 2015 IEEE International Symposium on , vol., no., pp.1184-1188, 14-19 June 2015
(2015)

[25] **Phase Transitions in Sparse PCA [link]**
Thibault Lesieur, Florent Krzakala, Lenka Zdeborova Information Theory (ISIT), 2015 IEEE International Symposium on , vol., no., pp.1635-1639, 14-19 June 2015
(2015)

[26] **Phase recovery from a Bayesian point of view: the variational approach [link]**
Angélique Drémeau, Florent Krzakala Acoustics, Speech and Signal Processing (ICASSP), 2015 IEEE International Conference on Year: 2015 Pages: 3661- 3665 (2015)

[27] **Adaptive Damping and Mean Removal for the Generalized Approximate Message Passing Algorithm[link]**
J. Vila, P. Schniter, S. Rangan, F. Krzakala, L. Zdeborova Acoustics, Speech and Signal Processing (ICASSP), 2015 IEEE International Conference on Year: 2015 Pages: 2021 - 2025
(2015)

[28] **Sparse Estimation with the Swept Approximated Message-Passing Algorithm [link]**
Andre Manoel, Florent Krzakala, Eric W. Tramel, Lenka Zdeborová
Proceedings of the 32nd International Conference on Machine Learning (ICML), 2015, 1123-1132
[29] **Spectral Clustering of Graphs with the Bethe Hessian [link]**
Alaa Saade, Florent Krzakala, Lenka Zdeborová
Advances in Neural Information Processing Systems 27 (NIPS 2014) pp 406-414

[30] **Replica Analysis and Approximate Message Passing Decoder for Superposition Codes [link]** Jean Barbier, Florent Krzakala Information Theory Proceedings (ISIT), 2014 IEEE International Symposium on, page(s) 1494 - 1498
(2014)

[31] **Variational Free Energies for Compressed Sensing [link]**
Florent Krzakala, Andre Manoel, Eric W. Tramel, Lenka Zdeborova Information Theory Proceedings (ISIT), 2014 IEEE International Symposium on, page(s) 1499 - 1503
(2014)

[32] On Convergence of Approximate Message Passing [link]
Francesco Caltagirone, Florent Krzakala, Lenka Zdeborová Information Theory Proceedings (ISIT), 2014 IEEE International Symposium on, page(s) 1812-1816 (2014)

[33] **The hard-core model on random graphs revisited [link]**
J. Barbier, F. Krzakala, L. Zdeborová, Pan Zhang International Meeting on "Inference, Computation, and Spin Glasses" (ICSG2013), Sapporo, Japan: J. Phys.: Conf. Ser. 473 012021 (2013)

[34] **Performance of simulated annealing in p-spin glasses [link]**
Florent Krzakala, Lenka Zdeborova, International Meeting on "Inference, Computation, and Spin Glasses" (ICSG2013),: J. Phys.: Conf. Ser. 473 012022 (2013)

[35] **Robust error correction for real-valued signals via message-passing decoding and spatial coupling [link]**
J. Barbier, F. Krzakala, L. Zdeborová P. Zhang IEEE Information Theory Workshop 1,5 (ITW 2013)

[36] **Blind Calibration in Compressed Sensing using Message Passing Algorithms [link]**
Christophe Schülke, Francesco Caltagirone, Florent Krzakala, Lenka Zdeborová
Advances in Neural Information Processing Systems 26 (NIPS 2013), pp 566--574 (2013)

[37] **Non-adaptive pooling strategies for detection of rare faulty items [link]**
Pan Zhang, Florent Krzakala, Marc Mézard, Lenka Zdeborová IEEE International Conference on Communications Workshops (ICC 2013), Pages: 1409 - 1414, (2013)

[38] **Phase Diagram and Approximate Message Passing for Blind Calibration and Dictionary Learning [link]** Florent Krzakala, Marc Mézard, Lenka Zdeborová Information Theory Proceedings (ISIT), 2013 IEEE International Symposium on, page(s) 659 - 663
(2013)

[39] **Compressed Sensing under Matrix Uncertainty: Optimum Thresholds and Robust Approximate Message Passing [link]**
Florent Krzakala, Marc Mézard, Lenka Zdeborová Acoustics, Speech and Signal Processing (ICASSP), 2013 IEEE International Conference on, pages 5519 - 5523 (2013)

[40] **Compressed Sensing of Approximately-Sparse Signals: Phase Transitions and Optimal Reconstruction [link]**
Jean Barbier, Florent Krzakala, Marc Mézard, Lenka Zdeborová Communication, Control, and Computing (Allerton), 2012 50th Annual Allerton Conference on , pp.800,807, 1-5 Oct. (2012)

[41] **Quantum Annealing of Hard Problems [link]**
Thomas Jorg, Florent Krzakala, Jorge Kurchan, A. C. Maggs Proceedings of the "YKIS 2009 : Frontiers in Nonequilibrium Physics" conference in Kyoto, August 2009. Progress of Theoretical Physics Supplement No. 184 (2010) pp. 290-303

[42] **Constraint optimization and landscapes[link]**
Jorge Kurchan & Florent Krzakala Contribution to STATPHYS23; Eur. Phys. J. B 64, 563 (2008)

[43] **Phase Transitions and Computational Difficulty in Random Constraint Satisfaction Problems** [link]
Florent Krzakala and Lenka Zdeborova Proceedings of the International Workshop on Statistical-Mechanical Informatics 2007, Kyoto (Japan) J. Phys.: Conf. Ser. 95 012012 (2017)

[44] **Aging, memory and rejuvenation: some lessons from simple models** [link]
Florent Krzakala, Federico Ricci-Tersenghi Proceedings of the Summerschool "Ageing and the glass transition", Luxembourg 14-25 Sept. 2005 2006 J. Phys.: Conf. Ser. 40 42-49

[45] **How many colors to color a random graph?** [link]
F. Krzakala, Proceeding of "Statistical Physics of Disordered Systems and Its Applications", Hayama (Japan), July 2004 Progress of Theoretical Physics Supplement No.157 (2005) pp. 357-360

[46] **Zero temperature phase diagram of finite connectivity spin glasses** [link]
F. Krzakala, Proceeding of "Statistical Physics of Disordered Systems and Its Applications", Hayama (Japan), July 2004, Progress of Theoretical Physics Supplement No.157 (2005) pp. 77-81

- ***Patent***

F. Krzakala, S.Gigan, L. Daudet, Laurent, I. Carron, A. Drémeau, A. Saade
« Digital-data mixing apparatus and digital data processing system »
European Patent application **EP15305165** [link]