Irène Waldspurger

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Positions

2019-2021 **Professeure attachée**.
Paris Sciences et Lettres (PSL)

2017- **Chargée de recherches CNRS**.
CEREMADE, Université Paris Dauphine.
Member of Inria team MOKAPLAN

2016-2017 **Post-doctoral fellow**, mentored by Philippe Rigollet.
Institute for Data, Systems and Society, MIT

2011-2015 **Phd thesis**, *Module de la transformée en ondelettes : reconstruction de phase et scattering*, advised by Stéphane Mallat.
DATA team, Computer science department, ENS Paris
Defended on November 10, 2015

2010-2011 **Master 2**, *Fundamental mathematics*.
Université Pierre et Marie Curie, Paris 6

2008-2012 **Student at ENS Paris**.

2006-2008 **Classe préparatoire**.
Lycée Louis-le-Grand, Paris
Admitted at ENS Paris (rank 1)

Research interests

Non-convex optimization.
Understand why and under which conditions seemingly naive algorithms succeed in solving difficult non-convex problems, with a focus on low-rank matrix recovery.

Phase retrieval problems.
Study the theoretical properties of specific phase retrieval problems (uniqueness and stability), develop new algorithms and improve existing ones.

Grants and distinctions

October 2020 **Cours Peccot**.
Collège de France

2019- **Springboard member**.
Paris artificial intelligence research institute (Prairie)

2016 **Postdoctoral fellowship**.
Institute for Data, Systems and Society, MIT

Articles

Preprint

I. Waldspurger. Lecture notes on non-convex algorithms for low-rank matrix recovery. Review article. `http://arxiv.org/abs/2105.10318`, 2021.

Published

I. Waldspurger and A. Waters. Rank optimality for the Burer-Monteiro factorization. *SIAM journal on Optimization*, 30(3):2577–2602, 2020.

I. Waldspurger. Phase retrieval with random Gaussian sensing vectors by alternating projections. *IEEE Transactions on Information Theory*, 64:3301–3312, 2018.

I. Waldspurger. Exponential decay of scattering coefficients. In *2017 International conference on Sampling Theory and Applications*. IEEE, 2017.

I. Waldspurger. Phase retrieval for wavelet transforms. *IEEE Transactions on Information Theory*, 63:2993–3009, 2017.

F. Fogel, I. Waldspurger, and A. d'Aspremont. Phase retrieval for imaging problems. *Mathematical programming computation*, pages 1–25, 2016.

H. Ammari, S. Mallat, I. Waldspurger, and H. Wang. Wavelet methods for shape perception in electro-sensing. *Contemporary mathematics*, 660:1–21, 2016.

S. Mallat and I. Waldspurger. Phase retrieval for the Cauchy wavelet transform. *Journal of Fourier Analysis and Applications*, 21:1251–1309, 2015.

I. Waldspurger, A. d'Aspremont, and S. Mallat. Phase recovery, Maxcut and complex semidefinite programming. *Mathematical programming*, 149:47–81, 2015.

Teaching

Courses

2019-2021 **Cours**, Master IASD, Paris Sciences et Lettres.
Optimisation, cours coordonné par Gabriel Peyré (9h d'équivalent TD, deux années)

2017- **Cours et travaux dirigés**, Licence 1, Université Paris Dauphine.
Analyse 1 (93,6h d'équivalent TD)
Analyse 2 (50,7h d'équivalent TD, trois années)
Pré-rentrée calcul (31,2h d'équivalent TD, deux années)

2013-2015 **Agrégée-préparatrice (équivalent)**, ENS Paris.
Topologie en L3 (52h, deux années)
Traitement du signal en L3 (22h, deux années)
Équations aux dérivées partielles (26h)

2012-2013 **Travaux dirigés**, Licence 1, Université Pierre et Marie Curie.
Analyse 1 (36h)
Algèbre 2 (36h)

2008-2012 **Interrogations orales (colles)**, lycées Louis-le-Grand et Marcellin-Berthelot.

Administrative responsabilities

2020- **Co-responsable du programme transverse Data**, Paris Sciences et Lettres.

Other professional activities

2020 **Area chair**, *International Conference on Machine Learning* (ICML).

2019 **Co-organization of a session on phase retrieval**, Conference on *SAMpling Theory and Applications*, Bordeaux.

2014- **Reviews**, various journals (Applied and Computational Harmonic Analysis, SIAM Journal on Imaging Sciences ...) and conferences (ICLR, ICML, NIPS).

Popular science

Talks

March 2019 Quand les films prennent des couleurs, *Cycle SMAI & musée des arts et métiers*

February 2018 Minimisation de fonctions convexes, *MathPark*, Institut Henri Poincaré, Paris

June 2015 Reconstruction de phase pour le traitement de signaux audio, *Mathématiques en mouvement*, Institut Henri Poincaré, Paris

Articles

I. Waldspurger. Connexité des ensembles de Julia. *RMS*, 123, 2013.

I. Waldspurger. Problèmes de reconstruction de phase. *Images des mathématiques*, 2017.