Stéphane Mallat
Collège de France
3 rue d'Ulm, 75006 Paris

Education

1992 *Habilitation in Mathematics*, University of Paris Dauphine.
1985-88 *Ph.D in Electrical Engineering*, University of Pennsylvania, School of Engineering.
1984-85 *Engineering Diploma*, ¡Ecole Nationale Supérieure des Télécommunications of Paris.
1981-84 *Engineering Diploma* Ecole Polytechnique of Paris.

Professional Experience

2018-Present *Distinguished Research Scientist*, CCM, Flatiron Institute, Simons Foundation.
2017-Present *Professor*, Collège de France, Data Science Chair.
2012-2017 *Professor*, École Normale Supérieure, Computer Science Department.
2011-2012 *Schlumberger Chair Professor*, Institut des Hautes Études en Sciences.
2001-2007 *Founder and CEO*, Let It Wave.
1999-2002 *Department Chairman*, Applied Mathematics, Ecole Polytechnique.
1998-2003 *Research Professor*, New York University, Courant Institute.
1995-2012 *Professor*, Ecole Polytechnique, Department of Applied Mathematics.
Fall 1994 *Visiting Professor* Massachusetts Institute of Technology, Depart. of Electr. Eng.
Spring 1994 *, Visiting Professor*, University of Tel Aviv, Department of Applied Mathematics.
1988-1996 *Assistant and Tenured Associate Professor*, New York University, Courant Institute of Mathematical Sciences.

Awards

Officier de la L'egion d'Honneur, 2024.
Fourier Award, from the IEEE, in 2024.
Milner Award, Royal Society, in 2023.
Doctorate Honoris Causa, University of Mons, in 2021.
Doctorate Honoris Causa, Technion, in 2019.
Member of the French Academy of Technologies, elected in 2019.
Carl Friedrich Gauss Education Award, from the IEEE, in 2018.
Foreign Member of the US National Academy of Engineering, elected in 2017.
Sustained Impact Paper Award, from IEEE Signal Processing, in 2014.
Member of French Academy of Sciences, elected in 2014.
Innovation Medal, awarded by the French CNRS, 2013.
Advanced ERC, awarded by the European Research Council, 2012.
Schlumberger Chair, awarded by the IHES, France, 2011.
EUSIPCO Fellow in signal processing, 2010.

Aisenstadt Chair, awarded by the CRM, Canada, 2009.
EADS Grand Prize in Information Sciences, awarded by the French Academy of Sciences, 2007.
Légion d'Honneur, 2007.
IEEE Fellow in signal processing, 2005.
Information Society Technology Grand Prize for most innovative European products, awarded by European Technological Academies, 2004.
Citation Prize, for the most cited French researcher in computer science and engineering over the last 20 years, awarded by INIST-CNRS and Thomson , 2004.
First National Prize for Creation of an Innovative Company, awarded by the French Ministry of Research and Technology, 2002.
Plenary Lecture at the International Congress of Mathematicians, Berlin, August 1998.
Outstanding Achievement Award, of the SPIE Society of Optical Engineering, 1997.
Blaise Pascal Prize in Applied Mathematics, awarded by the French Academy of Sciences, 1997.
US Fellow of the Alfred Sloan Foundation in Mathematics, 1993.
1990 Paper Award, of the IEEE Signal Processing Society.

Recent Keynote Lectures at International Conferences: 2011 Inter. Conf. on Sampling Theory and Applications, 2011 Inter. Conf. On Scale Space and Variational Method, 2011 IEEE Conf. on Statistical Signal Processing, 2011 Distinguished Lecture Series, Taiwan Sinica, 2012 Int. Conf. IEEE ICASSP, 2012 Int. Conf. NIPS, 2013 Int. Conf. SPARS, 2013 Int. Symposium on Information Theory, 2014 Int. Conf. in Comput. Harmonic Analysis, 2014 Int. Conf. Comp. Vision Pat. Recognit. 2015 Int. Conf. AAMS-CAIMS., 2016 Int. Conf. GlobalISIP, 2017 Abel Prize lectures, 2018 Shancks lecture, 2018 Int. Conf. on Learning Theory (COLT), 2018 Int. Conf. on Signal Proc. and Communicat. (EUSIPCO). 2020 Int. Conf. on Math. and Scientific Machine Learning (MSML). 2021 Int. Joint Conf. on Artificial Intelligence (IJCAI). 2021 Int. IEEE Conf. on Biomedical Imaging (ISBI). 2021 Int. IMU 100 years. 2022 Int. EMS-AMS-SMF Conf. 2023 Int. BASP Frontiers Conf. 2023 Int. Panorama of Mathematics 2024 Distinguished Salam Lectures of ICPT

Academic Responsibilities

Member of technical committees of more than 100 International conferences since 1988.
Guest editor of several special issues of the IEEE Transactions, Editor of the journal on "Advances in Computational Mathematics", from 1993 to 1996. Editor of the "Journal of Visual Communication and Image Representation", from 1993 to 1996. Associate editor of the "Journal of Fourier Analysis and Applications", from 1996 to 2003. Associate editor of the "Journal of Constructive Approximation" from 2000 to 2005. Associate editor of the "SIAM Journal of Multiscale Modeling and Simulation" from 2001 to 2005. Associate editor of the journal on "Applied and Computational Harmonic Analysis"

Member of the Digital Signal Processing committee of the IEEE Signal Processing Society from 1994 to 1999. Member of the Multidimensional Digital Signal Processing committee of the IEEE Signal Processing Society from 1999 to 2003. Member of the scientific counsel of "France Telecom" from 1997 to 2003 and of "Alcatel Space Industries" from 2001 to 2005.

Member of the "Comité National" of the French CNRS in 2000. President of the scientific comittee of the "Action Concertée Incitative", of the French Ministry of Research to develop "New Mathematics Interfaces", in 2003 and 2004, Member of the Conseil Scientific of "Paris-Tech" since 2008, President of the Conseil Scientific of the "Fondations des Mathématiques de Paris" from 2010 to 2013, Member of the Scientific Advisory Board of the Turing Institute since 2016, Member of the Conseil Scientific of "Universit Cte d'Azur" since 2016, Member of the Structure Committee of the "International Conference of Mathematics".

Graduated Doctoral Students
Sifen Zhong, 1992, Computer Science, Courant Institute,New York University.
Zhifeng Zhang,1994, Mathematics, Courant Institute,New York University.
Wen-Liang Hwang, 1994, Computer Science, Courant Institute,New York University.
Geoff Davis, 1996, Mathematics, Courant Institute,New York University.
François Bergeaud, 1996, Applied Mathematics,March 1996, Ecole Centrale.
Christophe Bernard, 1999, Applied Mathematics, Ecole Polytechnique.
Maureen Clerc, 1999, Applied Mathematics, September 1999, Ecole Polytechnique.
Rémi Gribonval, 1999, Applied Mathematics, September 1999, Ecole Polytechnique.
Jérome Kalifa, 1999, Applied Mathematics, Ecole Polytechnique.
Yann Samuelide, 2001, Applied Mathematics, Ecole Polytechnique.
Erwan LePennec, 2002, Applied Mathematics, Ecole Polytechnique.
Gabriel Peyre, 2005, Applied Mathematics, Ecole Polytechnique.
Charles Dossal, 2005, Applied Mathematics, Ecole Polytechnique.
Guoshen Yu, 2009, Applied Mathematics, Ecole Polytechnique.
Joan Bruna, 2012, Applied Mathematics, Ecole Polytechnique.
Jokaim Andèn, 2013, Applied Mathematics, Ecole Polytechnique.
Laurent Sifre, 2014, Applied Mathematics, Ecole Polytechnique.
Irène Waldspurger, 2015, Applied Mathematics, Ecole Normale Supérieure.
Vincent Lostanlen, 2016, Computer Science, Ecole Normale Supérieure.
Edouard Oyallon, 2017, Computer Science, Ecole Normale Supérieure.
Mathieu Andreux, 2018, Computer Science, Ecole Normale Supérieure.
Tomas Angles, 2019, Computer Science, Ecole Normale Supérieure.
Louis Thiry, 2020, Computer Science, Ecole Normale Supérieure.
John Zarka, 2022, Computer Science, Ecole Normale Supérieure.
Florentin Guth, 2023, Applied Mathematics, Ecole Normale Supérieure.
Rudy Morel, 2023, Applied Mathematics, Ecole Normale Supérieure.
Gaspar Rochette, 2023, Applied Mathematics, Ecole Normale Supérieure.

Publications

Journal Articles
S. Mallat, "A theory for multiresolution signal decomposition : the wavelet representation," *IEEE Transaction on Pattern Analysis and Machine Intelligence,* vol. 11, p. 674-693, July 1989.
S. Mallat, "Multiresolution approximation and wavelet orthonormal bases of $\mathbf{L}^2(\mathbf{R})$," *Transaction of the American Mathematical Society,* vol. 315, p. 69-87, Sept. 1989.

S. Mallat, "Multifrequency channel decompositions of images and wavelet models", *IEEE Transaction in Acoustic Speech and Signal Processing,* vol. 37, p. 2091-2110, Dec. 1989.
S. Mallat, "Zero-Crossings of a Wavelet Transform", *IEEE Transactions on Information Theory,* vol. 37, p. 1019-1033, July 1991.
S. Mallat, W.L. Hwang, "Singularity detection and processing with wavelets", *IEEE Transactions on Information Theory,* vol. 32, no. 2, March 1992.
S. Mallat, S. Zhong, "Characterization of signals from multiscale edges", *IEEE Transaction on Pattern Analysis and Machine Intelligence,* vol. 14, No. 7, p. 710-732, July 1992.
E. Bacry, S. Mallat, G. Papanicolaou, "A wavelet based space-time adaptive numerical method for partial differential equations", *Mathematical Modeling and Numerical Analysis,* vol. 26, No. 7, p. 793, 1992.
S. Mallat, S. Zhang, "Matching Pursuits With Time-Frequency Dictionaries", *IEEE Transactions on Signal Processing*, vol 41, no. 12, p. 3397-3415, December 1993.
W. L. Hwang, S. Mallat "Characterization of Self-Similar Multifractals with Wavelet Maxima", *Applied and Computational Harmonic Analysis,* vol. 1, p. 316-328, 1994.
G. Davis, S. Mallat and Z. Zhang, "Adaptive Time-Frequency Decompositions", *SPIE Journal of Optical Engineering,* vol. 33, No. 7, p. 2183-2191, July 1994.
S. Mallat,"Wavelets for a Vision", *Proceeding of the IEEE*, vol. 4, no. 4, p. 604-614, April 1996.
G. Davis, S. Mallat and M. Avelaneda, "Adaptive Greedy Approximations", *Jour. of Constructive Approximation,* vol. 13, No. 1, pp. 57-98, 1997.
F.Bergeaud, S.Mallat, "Matching Pursuit: Adaptative representations of images and sounds", *Computational and Applied Mathematics,* Vol. 15, no. 2, Birkhauser, Boston, October 1996.
S. Mallat and F. Falzon, "Analysis of low bit image transform coding", *IEEE Transactions on Signal Processing,* April 1998.
S. Mallat, G. Papanicolaou and Z. Zhang, "Adaptive Covariance Estimation of Locally Stationary Processes", *Annals of Statistics,* vol. 26, no. 1, February 1998.
S. Jaggi, W. Karl, S. Mallat and A. Willsky, "High resolution pursuit for feature extraction", *Applied and Computational Harmonic Analysis*, vol. 5, p. 428-449, 1998.
S. Jaggi, W. Karl, S. Mallat and A. Willsky, "Silhouette recognition using high Resolution pursuit", *Pattenr Recognition*, vol. 23, no. 5, p. 753-771, May 1999.
H. Krim, D. Tucker, S. Mallat and D. Donoho, "On denoising and best signal representation" *IEEE Trans. on Information Theory*, vol. 45, no. 8, November 1999.
E. Chang, S. Mallat and C. Yap, "Wavelet-based foveation", *Applied and Computational Harmonic Analysis*, vol. 9, p. 312-335, 2000.
M. Clerc, S. Mallat, "The texture gradient equation for recovering shape from texture," *IEEE Trans. on Image Processing*, vol. 24 no. 4, pp. 536-549, April 2002.
J. Kalifa, S. Mallat, "Thresholding estimators for linear inverse problems and deconvolutions", *Annals of Statistics*, vol. 31, no. 1, pp 58-109, February 2003.
J. Kalifa, S. Mallat, B. Rougé, "Deconvolution by thresholding in mirror wavelet bases", *IEEE Trans. on Image Processing*, vol. 12, no. 4, pp. 446-457, 2003.
M. Clerc, S. Mallat, "Estimating deformations of stationary processes," *Annals of Statistics*, vol. 31, no. 6, December 2003.
D. Donoho, S. Mallat, R. Von Sachs and Y. Samuelides, "Signal and covariance estimation with macrotiles", *IEEE Trans. on Signal Processing*, vol. 53, no. 3, pp. 614-627, 2003.

S. Mallat, "Foveal detection and approximations for singularities", *Journal of Applied and Computational Harmonic Analysis*, vol 14, pp. 133-180, 2003.
E. Le Pennec, S. Mallat, "Sparse geometric image representation with bandelets", *IEEE Trans. on Image Processing*, vol 14, no. 4, p. 423-438, Avril 2005.
E. Le Pennec, S. Mallat, "Bandelet image approximation and compression", *SIAM Journal of Multiscale Modeling and Simulation*, vol. 4, no. 3, pp 992-1039, 2005.
G. Peyré, S. Mallat, "Surface compression with geometric bandelets", *ACM Transactions on Graphics (SIGGRAPH'05)*, vol. 24, no. 3, 2005.
G. Peyré, S. Mallat, "A review of bandlet methods for geometrical image representation", Numerical Algorithms, vol. 44, no. 3, p. 205-234, 2007.
G. Peyré, S. Mallat, "Orthogonal bandlet bases for geometric images approximation", Communicaton on Pure and Applied Mathematics, vol 61, no. 9,p. 1173-1212, February 2008.
G. Yu, S. Mallat, E. Bacry, "Audio denoising by time-Frequency block thresholding", IEEE Trans. on Signal Processing, vol 56, no. 5, p. 1830-1839, May 2008.
S. Mallat, *Geometrical Grouplets* Applied and Computational Harmonic Analysis, Volume 26, Issue 2, pp 161-180, March 2009.
S. Mallat, *Lettre Ouverte sur la Recherche et l'Innovation*, Gazette des Mathematiciens de la SMF, no. 121, Juillet 2009.
G. Yu, S. Mallat, *Super-Resolution with Sparse Mixing Estimators*, IEEE Trans. on Image Processing, vol. 99, May 2010.
C. Dossal, E. LePennec, S. Mallat, *Bandlet Image Estimation with Model Selection*, Signal Processing, vol. 91, no. 12, p. 2743-2753, 2011.
G. Yu, G. Sapiro, S. Mallat, *Solving Inverse Problems with Piecewise Lienar Estimators: From Gaussian Mixture Models to Structured Sparsity*, IEEE Trans. on Image Processing, 2012.
S. Mallat, *Group Invariant Scattering*, Communications in Pure and Applied Mathematics, vol. 65, no. 10, p. 13311398, October 2012.
J. Bruna, S. Mallat, *Invariant Scattering Convolution Networks*, IEEE Trans. on PAMI, vol. 35, no. 8, p. 1872-1886, August 2013.
I. Waldspurger, A. dAspremont, S. Mallat, *Phase recovery, maxcut and complex semidefinite programming* Mathematical Programming, vol. 7, no. 38, 1-35, 2013.
J. Andèn, S. Mallat, *Deep Scattering Spectrum*, IEEE Trans. on Signal Processing, vol 62, no. 16, April 2014.
V. Chudacek,J. Anden, S. Mallat, P. Abry, M. Doret, "Scattering Transform for Intrapartum Fetal Heart Rate Variability Fractal Analysis: A Case-Control Study", IEEE Trans. on Biomedical Engin., vol 61, no. 4, April 2014.
J. Bruna, S. Mallat, E. Bacry, J.F. Muzy, "Intermittent Process Analysis with Scattering Moments," Annals of Statistics, vol. 43, no. 1, 2015.
S. Mallat, I. Waldspurger, "Phase retrieval for the Cauchy wavelet transform," Jour. of Fourier Analysis and Applications, vol. 21, no. 6, 2015.
G. Wolf, S. Mallat, S. Shamma, "Rigid Motion Model for Audio Source Separation," IEEE Trans. on Signal Processing, vol. 64, no.7, 2016.
S. Mallat, "Understanding Deep Convolutional Networks," Phil. Transact. A, Royal Society, vol. 374, no. 2025, 2016.
H. Ammari, S. Mallat, I. Waldspurger, H. Wang, "Wavelet Methods for Shape Perception in Electrosensing," Contemporary mathematics, American Mathematical Society, vol. 660, 2016.

X. Cheng, X. Chen, S. Mallat, "Deep Haar Scattering Networks," IMA Jour. of Information and Inference, Oxford University Press, vol. 5, no. 2, April 2016.
M. Hirn, S. Mallat, N. Poilvert, "Wavelet Scattering Regression of Quantum Chemical Energies", *SIAM Journal of Multiscale Modeling and Simulation*, vol 15, no. 2, March 2017.
M. Eickenberg, G. Exarchakis, M. Hirn, S. Mallat, L. Thiry, "Solid Harmonic Wavelet Scattering for Predictions of Molecule Properties", *Jour. of Chemical Physics*, vol 148, no. 24, May 2018.
J. Bruna, S. Mallat, "Multiscale sparse microcanonical models", Jour. of Math. Stat. and Learning, vol. 1, no. 3, p. 257315, Novembre 2018.
J. Andèn, V. Lostanlen, S. Mallat, "Classification with joint time-frequency scattering," IEEE Trans. on Signal Processing, vol 17, no. 4, May 2019.
S. Mallat, S. Zhang, G. Rochette, "Phase Harmonic Correlations and Convolutional Neural Networks", Journ. of Information and Inference of the IMA, vol 9, no, 3, 2020.
E. Allys, F. Levrier, S. Zhang, C. Colling, B. Rgaldo, F. Boulanger and S. Mallat, "The RWST, a comprehensive statistical description of the non-Gaussian structures in the ISM", Journ. of Astronomy & Astrophysics, vol. 629, A115 (2019).
C. Lapointe, T. Swinburne, L. Thiry, S. Mallat, L. Proville, C. Becquart, M. Marinica, "Machine learning surrogate models for prediction of point defect vibrational entropy", Phys. Rev. Materials, March 2020.
M. Andreux, T. Angles, G. Exarchakis, R. Leonarduzzi, G. Rochette, L. Thiry, J. Zarka, S. Mallat, J. Anden, J. Belilovsky, "Kymatio: Scattering Transforms in Python," JMLR, 21(60):16, 2020.
E. Allys, T. Marchand, J.-F. Cardoso, F. Villaescusa-Navarro, S. Ho, S. Mallat (2020). New Interpretable Statistics for Large Scale Structure Analysis and Generation. Physical Review D, 102(10), 2020.
S. Zhang and S. Mallat, Maximum entropy models from phase harmonic covariances, Applied and Computational Harmonic Analysis, vol. 53, pp. 199-230, July 2021.
A. Brochard, B Baszczyszyn, S Zhang, S Mallat, "Particle gradient descent model for point process generation", Statistics and Computing, vol. 32, no. 3, 49, 2022.
T. Marchand, M. Ozawa, G. Biroli, S. Mallat, Multiscale data-driven energy estimation and generation", Phys. Rev. X, vol 13, no. 9, Nov. 2023.
S. Cheng, R Morel, E. Allys, B. Ménard, S. Mallat, "Scattering Spectra Models for Physics", PNAS-Nexus, vol. 3, April 2024.
R. Morel, S. Mallat, J.-P. Bouchaud, "Path Shadowing Monte-Carlo", to appear in Quantitative Finance, 2024.
F. Guth, B. Ménard, G. Rochette, S. Mallat, "A rainbow in deep network black boxes", submitted to Journal of Machine Learning Research, arXiv:2305.18512.
R. Morel, G. Rochette, R. Leonarduzzi, J-P. Bouchaud, S. Mallat, "Scale dependencies and self-similar spectra with wavelet scattering spectra", arXiv:2204.10177, submitted to Applied and Computational Harmonic Analysis.

International Patents

E. Le Pennec, S. Mallat, "Method and apparatus for processing and compressing n-dimensional signals by foveal filtering along trajectories", 2001, US6,836,569
C. Bernard, J. Kalifa, E. Le Pennec and S. Mallat, "Method and apparatus for processing or compressing n-dimensional signals with warped wavelet packets and bandelets", 2002, PCT: WO 2004/056120 A1, USA: US7,944,974, Europe: EP1574067 A1

S. Mallat, "Method and apparatus for enhancing signals with multiscale grouping bandelets", November 2005, PCT: WO 2007/059795, US8,189,939.
J. Bruna and S. Mallat, "Method and apparatus for robust super-resolution video scaling", April 2006, PCT: WO2007/115583 A1, US8,054,380.
Bernard, J. Bruna, E. Laveau, S. Mallat, "Method and apparatus for spatio-temporal subband video enhancement with small time delay", October 2006, PCT: WO2008044091 (A1), US8,229.245.
M. Glinsky, J. Kalifa, S. Mallat, "Method for determining impedence coefficients of a seismic trace",October 2007, USA: US7,519,477, Europe: EP2007/254160.
C. Bernard and S. Mallat, "Frame buffer compression for video processing devices",October 2007, PCT: WO2009/053780, US8,559,499.
S. Mallat, "Filter banks for enhancing signals using oversampled subband transforms", January 2008, PCT: WO2009/081238, US8,620,979.
S. Mallat and G. Yu, "Video enhancement using recursive bandlets", February 2008, PCT: WO2009/098546, US8,792,553.
S. Mallat, "Multiscale moduluse filter bank and appliations to pattern detection, clustering, classification and registration", 2010, EP10305565, US8,953,875.

Book
S. Mallat, "A Wavelet Tour of Signal Processing", Academic Press, Elsevier, January 1998. Second edition, September 1999. Third edition "The Sparse Way" January 2009. Translations in French, Chinese, Japanese and Russian.
S. Mallat, "Sciences des donnes et apprentissage en grande dimension", collection Leon inaugurales du Collge de France, Fayard, 2018.

Book Chapters
S. Mallat, "Multiresolution approach to wavelets in computer vision", in *Wavelets* ed. Combes et. al., Springer Verlag, 2nd edition, 1990.
S. Mallat, S. Zhong, "Wavelet transform and multiscale edges", *Wavelet and Applications* ed. Coifman et. al., Jones and Bartlett, 1991.
J. Froment and S. Mallat, "Second generation compact image coding with wavelets", in *Wavelets-A Tutorial in Theory and Applications,* ed. C. Chui, p. 655-678, Academic Press, January 1992.
G. Davis, S. Mallat and Z. Zhang, "Adaptive Approximations With Matching Pursuits", in *Wavelet Theory and Applications,* ed. C. Chui, Academic Press, 1996.
S. Mallat, F. Falzon, "Understanding image transform codes", in *Advances in Wavelets*, ed. Ka-Sing Lau, Springer Verlag 1998.
J. Kalifa, S. Mallat, 'Minimax restoration and deconvolution", in *Bayesian inference in wavelet based models*, e. P. Muller and B. Vidakovic, Springer-Verlag, 1999.
M. Clerc, S. Mallat "Shape from texture and shading with wavelets", in *Dynamical systems, control, coding, computer vision*, Birkauser, 1999, Progress in Systems and Control Theory, vol. 25.
S. Mallat, Quelles limites pour lintelligence artificielle au travail ? , chapitre dans Le travail au XXIme sicle , dit par A. Supiot, ditions de lAtelier, Juin 2019.

Proceedings of Conferences
S. Mallat, "An efficient image representation for multiscale analysis," *Proc. of Machine Vision*

Conference, Lake Tahoe, Feb. 1987.
S. Mallat. "Fractal signal decomposition," *Proc. of International Conference on Circuits and Systems,* Philadelphia, May 1987.
S. Mallat. "Scale change versus scale space representation," *Proc. of 1st. International Conference on Computer Vision,* London, June 1987.
S. Mallat. "A compact multiresolution representation : the wavelet model," *Proc. of IEEE Workshop on Computer Vision,* Miami, Florida, December 1987.
S. Mallat. "Wavelet energy zero-crossings representation" *Proc. of 2nd. International Conference on Computer Vision,* Miami, December 1988.
S. Mallat, N. Treil, S. Zhong "Image coding from multiscale edges" *Proc. of International Electronic Imaging Conference* Boston, October 1989.
S. Mallat, S. Zhong "Signal characterization from multiscale edges" *Proc. of 10th International Conference on Pattern Recognition* Atlantic City, June 1990.
S. Zhong, S. Mallat "Compact image representation from multiscale edges" *Proc. of 3rd. International Conference on Computer Vision* Osaka, December 1990.
S. Mallat, S. Zhong "Compact image coding from edges with wavelets", *Proc. of Internation Conference in Acoustics Speech and Signal Processing* Toronto, May 1991.
E. Bacry, S. Mallat, G. Papanicolaou, "Adaptive numerical scheme for the resolution of non-linear PDE" *Worshop on "Wavelets and Turbulence",*
Princeton Univ., June 1991. S. Mallat, W.L. Hwang, "Characterization of singularities", *Proc. of NATO Advanced Study Institute on Probabilistic and Stochastic Methods in Analysis,* El Ciocco, Italy, July 1991.
A. Chambolle, D. Geiger, S. Mallat, "Un algorithme multi-echelle de mise en correspondance stereo base sur les champs markoviens," in *Proc. of 13th GRETSI Conf. on Signal and Image Processing,* Juan-les-Pins, France, September 1991.
W.L. Hwang, S. Mallat, "Singularities and noise discrimination with wavelets", *Proc. of Internation Conference in Acoustics Speech and Signal Processing* San Francisco, March 1992.
S. Mallat, S. Zhang, "Structural analysis of signals", *Workshop on the Role of Wavelets in Signal Processing Applications,* Dayton, Ohio, March 1992.
S. Mallat, S. Zhang, "Non-linear adaptive time-frequency decomposition" *Internation conference on Wavelets and Applications,* Toulouse, France, June 1992.
J. Froment, S. Mallat, "Compact image coding with the wavelet maxima", *Internation conference on Wavelets and Applications,* Toulouse, France, June 1992.
E. Bacry, S. Mallat, G. Papanicolaou, "Time and space adaptive scheme for non-linear PDE", *Internation conference on Wavelets and Applications,* Toulouse, France, June 1992.
E. Bacry, S. Mallat, G. Papanicolaou, "Wavelet based numerical scheme for PDE", *International Conference on Spectral and High Order Methods,* Montpellier, France, June 1992.
S. Mallat, Z. Zhang, "Adaptive time-frequency decomposition with matching pursuit", *IEEE International Symposium on Time-Scale and Time-Frequency Analysis,* Victoria, Canada, October 1992.
S. Mallat, Z. Zhang, "Adaptive decompositions in signal processing" *Conference on Concurrent Computing in the Physical Sciences,* Louisiana State University, Baton Rouge, Feb. 1993.
S. Mallat, Z. Zhang, "Adaptive time-frequency transform", *IEEE International Conference on Acoustics Speech and Signal Processing,* Minneapolis, April 1993.

G. Davis, S. Mallat, Z. Zhang, "Chaos in matching pursuit" *International SPIE conference* Orlando, June 1994.
F. Bergeaud, S. Mallat, "Matching Pursuit of Images", IEEE "International Symposium on Time-Frequency and Time-scale Analysis", Philadelphia, October 1994.
F.Bergeaud, S.Mallat, "Applications of Matching Pursuits to Images", *IEEE Internataional Conference on Image Processing,* Washington D.C., November 1995.
F.Bergeaud, S.Mallat, "Image analysis with Matching Pursuits", *SPIE conference on Wavelets*, Orlando, FL, April 1995.
S. Mallat, G. Papanicolaou, Z. Zhang, "Estimation of locally stationary processes with best bases", *SPIE conference on Wavelets*, San Diego, CA, July 1995.
S. Mallat, G. Papanicolaou, Z. Zhang, "Covariance estimation with best bases" *IMS International Conference on Statistics,* Montreal, July 1995.
S. Mallat, G. Papanicolaou, Z. Zhang, "Characterization of locally stationary processes" *IMS International Conference on Statistics,* Montreal, July 1995.
S. Mallat, G. Papanicolaou, Z. Zhang, M. Clerc, "Estimation of localy stationary and localy dilated processes" *IEEE Internation Symposium on Time-Frequency,* Paris, June 1996.
D. Donoho, S. Mallat, R. von Sachs, "Estimating Covariances of Locally Stationary Processes: Consistency of Best Basis Methods", *IEEE Internation Symposium on Time-Frequency,* Paris, June 1996.
J.Kalifa, S.Mallat, F.Falzon, B.Rouge, "High resolution satellite image restoration with frames", *International SPIE conference*, Denver, July 1996.
R. Gribonval, E. Bacry, S. Mallat, Ph. Depalle and X. Rodet, "Analysis of sound signals with high resolution matching pursuit", Proc. IEEE Symp. Time-Frequency and Time-Scale Analysis, June 1996.
R. Gribonval, E. Bacry, S. Mallat, Ph. Depalle and X. Rodet, "Sound signal decomposition using a high resolution matching pursuit", Proc. International Cmput. Music Conf., August 1996.
M. Clerc and S. Mallat, "Estimation of locally dilated processes", Institute of Mathematical Statistics Annual meeting, July 1997.
J. Kalifa, S. Mallat and B. Rougé, Restauration d'images par paquets d'ondelettes", Proc. 16eme colloque GRETSI, Grenoble 1997.
J. Kalifa, S. Mallat, B. Rougé, "Image deconvolution in mirror wavelet bases", IEEE 1998 Int. Conf. on Image Proce., Chicago, 1998.
M. Clerc, S. Mallat, "Identifying locally dilated processes", Internat. Wavelets Conf., Tanger, April 1998.
C. Bernard, S. Mallat, J-J. Slotine, "Wavelet Interpolation Networks", European Symp. on Artificial Neural Networks, Bruges, April 1998.
M. Clerc, S. Mallat, "Shape recovery by wavelet analysis of textures", Proc. Wavelet and applications workshop, October 1998.
C. Bernard, S. Mallat, J-J. Slotine, "Wavelet interpolation networks for hierarchical interpolations", Proc. of SPIE 44th Annual meeting, Dever, July 1999.
J. Kalifa, S. Mallat, B. Rougé, "Minimax solution of inverse problems and deconvolution by mirror wavelet thresholding", 44th SPIE Conf., Denver Colorado, 1999.
J. Kalifa, S. Mallat, "Deconvolution par ondelettes miroirs", XXXI journées Satistiques, Grenoble, 1999.

M. Clerc, S. Mallat, "Shape from texture through deformations", International Conf. on Computer Vision, Corfou, 1999.
E. Le Pennec, S. Mallat, "Image Compression with Geometrical Wavelets", International Conf. on Image Processing, Vancouver, September 2000.
E. Le Pennec, S. Mallat, "Reprsentation d'Image par Bandelettes et Application la Compression", GRETSI 2001, Toulouse, September 2001.
E. Le Pennec, S. Mallat, "Sparse Image Representation with Bandelets", DIMACS Workshop on Source Coding and Harmonic Analysis, New Brunswick, NJ, May 2002.
E. Le Pennec, S. Mallat, "Geometric Bandelet Image Compression", IEEE International Conf. VCIP 2003, Lugano, July 2003.
E. Le Pennec, S. Mallat, "Traitement d'image géométrique", Conférence GRETSI 2003, Paris, Septembre 2003.
E. Le Pennec, C. Dossal, G. Peyr, S. Mallat, "Estimation gomtrique dimages et bases de bandelettes orthogonales", Conference GRETSI 2007, September 2007.
G. Yu, E. Bacry, S. Mallat, "Audio Signal Denoising with Complex Wavelets and Adaptive Block Attenuation", IEEE International Conf. on Acoustics, Speech, and Signal Processing, Hawaii, 2007.
G. Yu, S. Mallat, "Super Resolution with Space Matching Pursuits", International SPARS conf., April 2009.
S. Mallat, G. Yu, "Structured Pursuit for Geometric Super-Resolution", IEEE ICIP conf., November 2009.
S. Mallat, "Recursive Interferometric Representations," Proc. of EUSIPCO Conference, Danemark, August 2010.
J. Bruna, S. Mallat, "Invariant Representations for Visual Perception," AVA Workshop, December 2010, Paris.
J. Bruna, S. Mallat, "Classification with Scattering Operators", Proc. CVPR, 2011.
J.Bruna, S. Mallat, Classification with Invariant Scattering Representations , Proc. of IEEE IVSMP, June 2011.
J. Anden, S. Mallat, "Multiscale Scattering for Audio Classification", Proc of ISMIR, Florida, October 2011.
L. Sifre, S. Mallat, "Combined Scattering for Rotation Invariant Texture Analysis", Proc of ESANN, Bruge, April 2012.
J. Anden, S. Mallat, "Scattering représentation of modulated sounds , Conference on Digital Audio Effects, York, Angleterre, Septembre 2012.
C. Baugé, M. Lagrange, J. Andèn, S. Mallat, "Representing environmental sounds using the separable scattering tranform", ICASSP, May 2013.
L. Sifre, S. Mallat, "Rotation, Scaling and Deformation Invariant Scattering for Texture Discrimination", CVPR, June 2013.
V. Chudacek, J. Anden, S. Mallat, P. Abry, M. Doret, "Scattering transform for intrapartum fetal heart rate characterization and acidosis detection", EMBC, July 2013.
E. Oyallon, S. Mallat, L. Sifre. "Generic Deep Networks with Wavelet Scattering," International Conference on Learning Representations (ICLR), March 2014.
G. Wolf, S. Mallat, S. Shamma, "Audio Source Separation with Time-Frequency Velocities", 2014 IEEE Int. Work. on Machine Learning for Sig. Proces., September 2014.
V. Chudacek, R. Talmon, J. Anden, S. Mallat, R. Coifman, P. Abry, M. Doret, "Low dimensional manifold embedding for scattering coefficients of intrapartum fetal heart rate variability", Int. Conf.

of the IEEE Engineeing in Medicine and Biology, August 2014.
X. Chen, X. Cheng, S. Mallat, "Unsupervised Deep Haar Scattering on Graphs", NIPS December 2014.
E. Oyallon, S. Mallat, "Deep Roto-Translation Scattering for Object Classification," IEEE CVPR, June 2015.
V. Lostanlen, S. Mallat, "Transforme en scattering sur la spirale temps-chroma-octave", GRETSI, September 2015.
V. Lostanlen, S. Mallat, "Wavelet Scattering on the Pitch Spiral," Conference on Digital Audio Effects, November 2015.
J. Anden, V. Lostanlen, S. Mallat, "Joint Time-Frequency Scattering For Audio Classification," IEEE Workshop on Machine Learning and Sig. Process. September 2015.
J. Jacobsen, E. Oyallon, S. Mallat, and A. Smeulders, "Hierarchical Attribute CNNs", ICML PADL 2017.
M. Eickenberg, G. Exarchakis, M. Hirn, S. Mallat, "Solid Harmonic Wavelet Scattering: Predicting Quantum Molecular Energy from Invariant Descriptors of 3D Electronic Densities", NIPS, December 2017.
T. Anglès, S. Mallat, "Generative networks as inverse problems with Scattering transforms", ICLR, May 2018.
M. Andreux, S. Mallat, Music generation and transfformation with moment matching scattering inverse networks , ISMIR, September 2018.
A. Brochard, B. Blaszczyszyn , S.Mallat, S. Zhang, Statistical learning of geometric characteristics of wireless networks , Proc. of IEEE INFOCOM, Marroco, 2019.
R. Leonarduzzi, S.Mallat, J.P. Bouchaud, G. Rochette, Maximum entropy scattering models for financial time-series , Proc. of IEEE ICASSP, Brighton, May 2019.
J. Zarka, L. Thiry, T. Angles, S. Mallat, "Deep Netwwork Classification by Scattering and Homotopy Dictionary Learning", ICLR, April 2020.
J. Zarka, F. Guth, S. Mallat. Separation and Concentration in Deep Networks, Proc. of Int. Conf. on Learning Representations (ICLR), 2021.
A. Brochard, S. Zhang, S. Mallat, "Generalized rectifier wavelet covariance models for texture synthesis," Proc. of Int. Conf. on Learning Representations (ICLR), May 2021.
F. Guth, J. Zarka, S. Mallat. Phase Collapse in Neural Networks, Proc. of Int. Conf. on Learning Representations (ICLR), May 2022.
F. Guth, S. Coste, V. De Bortoli, S. Mallat, "Wavelet score-based generative modeling", NeurIPS, Dec. 2022.
Z. Kadkhodaie, F. Guth, S. Mallat, E. Simoncelli, Learning multi-scale local conditional probability models of images, ICLR May 2023.
F. Guth, E. Lempereur, J. Bruna, S. Mallat, Conditionally Strongly Log-Concave Generative Models, ICML July 2023.
Z. Kadkhodaie, F. Guth, E. Simoncelli, S. Mallat, Strong generalization in diffusion models", NeurIPS workshop, Dec. 2023.
Z. Kadkhodaie, F. Guth, E. Simoncelli, S. Mallat, Generalization in diffusion models arises from geometry-adaptive harmonic representation", ICLR May 2024.

Invited Conference and Workshop Presentations
"Wavelet and computer vision", *2nd colloque Ondelettes,* Marseilles, France, December 1987.

"Local extrema of the wavelet transform", *American Mathematical Society Conference,* Chicago, May 1989.
"Wavelet Maxima Representation" *3rd. Colloque Ondelette* Marseilles, June 1989.
"Image coding from the wavelet transform extrema" *Sixth Multidimensional Signal Processing Workshop* California, Sept. 1989.
"Wavelet Maxima and Edges" *Workshop on Multiresolution Signal Decomposition* NJIT, April 1990.
"The Wavelet Theory" *Workshop on Mathematics and Computer Vision* University of Pennsylvania, May 1990.
"Wavelets and Image Processings" *Workshop on the Wavelet Transform,* Ecole Normale Superieure, Paris, France, May 1990.
"Detection of singularities with the wavelet transform" *Army Research Office Mathematics Conference,* Cornell, June 1990.
"Characterization of signals from the wavelet transform maxima" *NSF/CBMS Conference on Wavelets,* Lowell, June 1990.
"Reconstruction of functions from the wavelet transform local maxima" *SIAM Conference,* Chicago, July 1990.
"Multiscale Transforms", *ATR Workshop on Modeling Human Visual Perception and Cognition* Kyoto, Japan, November 1990.
"Non-linear image coding with wavelets", *Workshop on applications of wavelets to signal processing,* Ohio, March 1991.
"Detection of singularities and applications to images", *INRIA Workshop on applied non-linear problems,* Rocquencour, France, June 1991.
"Wavelet transform and signal processing", *French-Chinese Summer school on wavelets,* Wuhan University, Wuhan, China, July 1992.
"Signal structuralism with a matching pursuit", *Workshop on applied mathematics and education,* Tel Aviv University, Tel Aviv, Israel, July 1992.
"Wavelets for PDE", *AMS-SIAM-IMS conference on Wavelets and Applications* Mount Holyoke, August 1992.
"Wavelet techniques for image processing", *Image processing summer school,* Les Houches, France, Sept. 1992.
"Wavelets and applications", *National academy of science workshop on the frontiers of sciences* San Diego, Nov. 1992.
"Wavelets in signal processing", *Worshop on surfaces and image processing,* IMPA, Rio, Brasil, Jan. 1993.
"Characterization of multifractals with wavelets", *Worshop on Multifractal, Turbulence and Wavelets,* Cambridge, England, March 1993.
"Wavelets in Image Processing", *Computer vision special semester,* Newton Institute of Mathematics, Cambridge, England, September 1993.
"Time-frequency decompositons with matching pursuit", *International Conference on Wavelets and Applications,* Taormina, Italy, October 1993.
"Characterization of renormalizations in multifractals", *International Conference on Wavelets and Applications,* Taormina, Italy, October 1993.
"Wavelets in Signal Processing" *Workshop on Splines and Wavelets* Technion, Haifa, Israel, April 1993.

"Applied harmonique analysis problems" *Norbert Wiener Centenial Conference,* Massachusetts Institute of Technology, October 1994.
"Applications of matching pursuits" *IEEE Workshop on Information Theory,* Alexandria, October 1994.
"Tutorial on Wavelets", *IEEE International Conference on Biomedical Enginnering,* Baltimore, November 1994.
F.Bergeaud, S.Mallat, "Adaptive expansion of images", *Neaman Worshop on Wavelets and Applications*, Technion University, Israël, June 1994.
"Wavelet in Signal Processing", *International Conference in Image Processing*, Lausanne, Switzerland, September 1996.
"Caractérisation des processus localement dilatés", *Journées de Statistiques*, Carcassonne, May 1997.
"Wavelet image compression", Congrés National d'Analyse Numérique, France, May 1997.
"Déconvolution d'images satellites par paquets d'ondelettes", *GRETSI*, Grenoble, France, September 1997.
"Tutorial on Wavelet in Image Processing", *American Math. Society Conference*, Baltimore, January 1998.
"Bandelet Representations for Image Compression", *Int. Conf on Image Processing*, Thessaloniki, October 2001.
"Reprsentation d'Image par Bandelettes et Application la Compression", *GRETSI 2001*, Toulouse, Septembre 2001.
"Multiscale Geometric Image Approximations", *SIAM Int. Conf. on Imaging Sciences*, Boston, March 2002.
"Bandelet Approximations", *Int. Conf. on Curves and Surfaces*, St. Malo, June 2002.
"Geometric Image Estimation in Noise", *Int. Conf. on Wavelets and Statistics*, Grenoble, September 2003.
"Compression of images with bandelets" *IEEE Workshop on Variational Geometric and Level Set Methods*, Sophia Antipolis, October 2003.
"The return of wavelets for image geometry," *Int. Conf. in Applied Computational Harmonic Analysis*, Vanderbilt, May 2004.
"Hierarchical geometrical image representation with plain wavelets," *Int. Workshop on Multiscale Geometric Processing*, Los Angeles, September 2004.
"Geometric representations of signals and images," *Int. Conf. on Foundations of Computational Mathematics*, Santander, Espagne, June 2005.
"Sparse spike deconvolution with minimum scale" *Workshop SPARS05*, Rennes, November 2005.
"Representation Geometriques des Images," *Workshop GDR-Vision*, Lyon, June 2007.
"Geometric bandlet processing for television," *Symposium on Mathematics in Digital Media, Technology and Entertainment*, Singapore, July 2007.
"Bandlet image processing", *Int. Worshop on Challenges in Theoretical and Applied Signal Processing*, EPFL, October 2007.
"Challenges of Image Processing Research in Industry", *Workshop Thales-SMAI sur Methodes Mathematiques en Traitement du Signal*, Paris, November 2007.
"Bandlets for HDTV video processing", *Int. Conf. on Consummer Electronics*, January 2008.
"From sparse to invariant representations", *Distinguished Lecture Series*, Academia Sinica, Taiwan, April 2011.

"Deep scattering networks for classification", *Snowbird Learning Workshop*, Avril 2011.
"Invariant statistical classification", *Workshop Annuel de la Socit Francaise de Statistiques*, Tunis, May 2011.
"Image classification by wavelet scattering", *Workshop on Variational Image Analysis*, Heildelerg, July 2011.
"Sparse image classification", *Int. Conf. on Sampling Theory and Applications*, Singapore, May 2011 .
"Scattering transform of images" *Int. Conf. On Scale Space and Variational Methods*, Israel, May 2011 .
"Invariant representation of processes", *IEEE Conf. on Statistical Signal Processing*, Nice, June 2011.
"Lie Group invariants by scattering" *Int. Conf. from Abstract to Computational Harmonic Analysis*, Strobl, Austria, June 2011.
"Learning from invariants", *Dagstul Workshop on Mathematical and Computational Foundations of Learning Theory*, July 2011.
"Classification with scattering convolution networks", *NIPS Workshop on Deep Learning and Unsupervised Feature Learning*, December 2011.
"Invariant classification of audio and images," *IPAM Workshop on multimdia search*, January 2012.
"Can classification speak mathematics ?", *Int. Conf. IEEE ICASSP*, Kyoto, Mars 2012.
"Estimating by Scattering", *Ecole de Statistiques*, Toulouse, June 2012.
"Learning with Group Invariants", *NIPS*, December 2012.
"Image scattering perception," *European Workshop on Visual Inf. Proc.*, Paris, June 2013.
"High-Dimensional Estimation with Scattering Networks", *Int. Workshop on Statistical Learning*, June 2013.
"Sparse Classification by Scattering," *Int. Symposium on Information Theory*, July 2013.
"Course on High-Dimensional Classification of Big Data", *Ecole du CIMPA 13*, Mar del Plata, Argentina, August 2013.
"Course on Estimation and Classification in High-Dimension", *Workshop in Statisticial Mathematics*, Frejus August 2013.
"Deep Scattering Classification", *Int. TCE conf.*, Israel, May 2014.
"Haar Dictionary Scattering Learning", *Int. Conf. on Curves and Surfaces*, Paris, 2014.
"Object Recognition with Roto-Translation Invariance", *Duke Workshop*, England, 2014.
"High Dimensional Learning", *Prospects in Applied Mathematics*, U. of Chicago, 2014.
"Vision with Deep Scattering Networks", *Int. conf. ACCV*, Singapore, 2014.
"Learning with Scattering", *Chien Distinguished Lectures*, U. of Illinois, 2014.
"Deep Learning for Big Data", *IMA Conf. on Big Data*, London 2014.
"Scattering for Quantum Chemistry", *IPAM Workshop*, Los Angeles, 2014.
"From Deep to Scattering Networks", *Deep Learning Workshop*, Italy, 2015.
"Group Invariants and Gestalt Image Analysis", *IHP Workshop on Geometry*, Paris, 2014.
"Course on Deep Scattering for Vision", *Int. Conf. ICVSS*, Sicily 2015.
"Scattering for Quantum Chemistry", *IPAM Workshop*, Los Angeles 2015.
"High-Dimensional Learning", *IMA workshop on Big Data*, 2015.
"Analyzing deep convolution networks", *Deep Learning Workshop*, Italy, 2015.
"Statistics of High Dimensional learning", *Workshop of SdF*, Paris, France, 2015.
"Learning with Deep Networks", *Statistical Learning workshop*, France, 2016.

"Quantum Chemistry learning by Scattering", *Statistical Learning workshop*, France, 2016.
"Mathematical Mysterties of Deep Networks", *Banff meeting on Learning*, Mexico, 2016.
"Regression of Quantum Chemistry Molecular Energies", *IPAM workshop on Many Particle Systems*, UCLA, 2016.
"Mathematics of Deep Learning", *Deep Learning Workshop*, Berlin, 2017.
"Mathematics of Deep Learning", *Daghstuhl workshop on Deep Learning for Computer Vision*, 2017.
"Generative Learning", *IPAM workshop on Deep Learning*, 2017.
"Learning as a High-Dimensional Approximation", *Shancks Lecture, Inter. Conf. on Comput. Harmonic Analysis*, Nashville, Mai 2018.
"Learning Cosmology", *Int. conf. on statistical challenges in 21st century Cosmology*, May 2018 .
"Learning statistical models", *workshop on New Horizons from Machine Learning to Finance*, May 2018 .
"Unsupervised Deep Learning and Statistical Models", *IEEE Workshop on Statistical Signal Processing*, Freiburg, 2018.
"Unsupervised and Generative Deep Learning," *COLT Conf. on Learning Theory, Stockholm*, July 2018.
"Deep Learning in Physics" *workshop on Statistical Physics and Machine Learning*, Cargese, Corsica, 2018.
"Mysteries of Deep Learning" *workshop on Deep Learning*, Rennes, September 2018.
"Deep convolution networks and filter banks", *EUSIPCO Int. Conf.*, Rome, Septemrre 2018.
"Unsupervised and supervised learning in networks", *workshop of AFIA-SF*, Paris, September 2018.
"Autoencoders as inverse problems" *workshop on Statistical Inference*, IHP Paris, October 2018.
"Convolutional Networks in AI" *workshop on Artifical Intelligence*, Academy of Sciences, Paris, Novembre 2018.
"Phase and Scattering in Deep Networks", *workshop on Machine Learning*, Harvard, March 2019.
"Learning autoencoders with scattering", *IHP workshop on Imaging*, Paris, April 2019.
"Learning physics with deep networks", *workshop on MLX & Physics*, New York, May 2019.
"Mathematical mysteries of deep networks", *Data Science Summer School*, Paris, Juin 2019.
"High-dimensional approximations in deep networks", *workshop structural inference in high-dimensional models*, St. Petersbourg, Russie, August 2019.
"From classification to autoencoders", *worshop de Harmonic analysis et machine learning*, Oxaca, Mexique, October 2019.
"Mathematics of neural networks", *Global Online Mathematical Data Science*, July 2020 .
Workshop of Oxford Mathematical Data Science, Nov. 2020
Workshop on Langage in Man and Machines, Collège de France, June 2021.
Workshop on Deep Maths, Flatiron, June 2021.
MATH + X Symposium on Dynamos, Planetary Exploration and General Relativity, Inverse Problems and Machine Learning, June 2022.
Workshop on Data Science, Approximation Theory and Harmonic Analysis, Fields Institute, June 2022.
Workshop of Machine Learning Assisted Sampling, Collège de France, Sept. 2022.
Abhu Dhabi AI Summit, Dec. 2022.
Biomedical and Astronomical Signal Processing Conf., Villars, Feb. 2023.
Math+X Workshop, Iceland, May 2023.

EPFL Signal Processing Workshop, EPFL, August 2023.
ADAX Workshop, Heraklion, Sept. 2023.