
PERSONAL INFORMATION

First Name: Dana
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CONTACT INFORMATION

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RESEARCH AREAS

- Algebraic methods for signal and data processing
 - Linear and multilinear algebra, tensor methods and decompositions
 - Low-rank approximations
 - Multimodal data fusion, joint analysis of multiple datasets, multi-way data analysis
 - Statistical signal processing
 - Blind source separation, independent component analysis
 - Nonnegative factorizations
 - Phase retrieval, signal recovery from quadratic measurements
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ACADEMIC APPOINTMENTS

2021– [Adjunct assistant professor](#) of Computer Science and Electrical Engineering in the University of Maryland Baltimore County, USA

2020–2024 Researcher in the School of Electrical Engineering, Tel Aviv University, Israel.

2018–2020 Post-doctoral researcher, double affiliation: [Centre national de la recherche scientifique—French National Centre for Scientific Research \(CNRS\)](#) and [Institut de Recherche en Informatique de Toulouse \(IRIT\)](#), Toulouse, France.
Supervisor: Dr. Cédric Févotte, CNRS, France.

2013–2018 Post-doctoral researcher, double affiliation: [Université Grenoble Alpes](#) and [Grenoble Images Parole Signal Automatique—Grenoble Images Speech Signal and Control \(GIPSA-Lab\)](#), Grenoble, France.
Supervisor: Prof. Christian Jutten, Univ. Grenoble Alpes, France

EDUCATION

PhD, 2005–2012 at the Department of Electrical Engineering–Systems, Faculty of Engineering, Tel Aviv University, Israel.
Supervisors: Prof. Hagit Messer-Yaron (Tel Aviv University, Israel)
Dr. Jean-François Cardoso (CNRS & Institut d’Astrophysique de Paris, France)
Title: [Second-Order Multidimensional ICA: Theory and Methods \[pdf\]](#)

MSc, 2001–2004 at the Department of Electrical Engineering–Systems, Faculty of Engineering, Tel Aviv University, Israel.
Supervisor: Prof. Anthony J. Weiss (Tel Aviv University, Israel)
Title: Performance Analysis of a Blind High-Order Statistics Separation Criterion

BSc, 1995–1998 in Electrical and Electronics Engineering, Faculty of Engineering, Tel Aviv University, Israel
Magna cum laude

PROFESSIONAL AND SCIENTIFIC APPOINTMENTS

2021 IEEE Senior Membership.

AWARDS

1994–1998 Cited on the Dean’s list for outstanding achievements 3 times during BSc studies
 2010 Weinstein Prize for Best Conference Paper (publication [CO-2](#) in the list below)

SCHOLARSHIPS & GRANTS

2007–2008 Chateaubriand Fellowship of the French Government
 2007–2009 Buchmann Fellowship for outstanding PhD students
 2005–2006 Tel Aviv University scholarship for PhD students
 2006 David and Paulina Trotsky Fund Scholarship
 2002 Neiman Abraham and Shaul Marco Scholarship
 2001–2003 Tel Aviv University scholarship for MSc students

WORK EXPERIENCE

ACADEMIC LEVEL TEACHING

2021, 2023, 2024 Guest lecturer in a graduate level course: *ENEE 718 - Topics in Signal Processing*, in the University of Maryland Baltimore County (UMBC), USA, a 5-hour lecture on tensor decompositions and algebraic methods in independent component analysis.

2001–2010 Teaching assistant at the Faculty of Engineering, Tel Aviv University, Israel. Undergraduate-level courses in the 4-year BSc program in Electrical and Electronics Engineering.

Frontal teaching:

1. Digital Communication
2. Introduction to Digital Signal Processing (DSP)
3. Random Signals and Noise

Educational lab:

1. Advanced Communications Lab
2. Advanced DSP Lab

2006–2008 Supervising three undergraduate, 4th-year student graduation projects, all under the framework of “Real-time extraction of sensory events from rat cerebellum” at the Faculty of Engineering, Tel Aviv University, Israel.

OTHER RESEARCH ACTIVITIES

2005–2008 Member of the EU project [ReNaChip](#), “Rehabilitation of a discrete motor learning function by a prosthetic chip”. Within this project, I collaborated with an interdisciplinary and international group (psychobiology, micro- and nano-electronics, data-mining, signal processing and others) as the principal signal processing active researcher. My contribution included developing algorithms (see items [TA-2](#), [TA-1](#) in “conference without proceedings” below), writing parts of grants and regular reports to the EU, and academic supervision of student graduation projects.

INDUSTRY

1999–2001 [NeoMagic Israel Ltd.](#), Netanya, Israel. Algorithm engineer.
 1997–1998 [Orckit Communications Ltd.](#), Tel Aviv, Israel. Operation and quality assessment of MATLAB and C++ simulations for VDSL and HDSL.

INTERNATIONAL ACTIVITIES

MEMBERSHIP IN TECHNICAL COMMITTEES

- Jan. 2023— Associate Member of the IEEE Signal Processing Theory and Methods Technical Committee (*SPTM TC*)
- Nov. 2022— Affiliate Member of the IEEE Machine Learning for Signal Processing Technical Committee (*MLSP TC*)
- Dec. 2019— Steering committee member of Latent Variable Analysis and Signal Separation / Independent Component Analysis (LVA/ICA)
- 2015, 2017, 2018 Program committee member of the 12th, 13th, and 14th International Conference on Latent Variable Analysis and Signal Separation (LVA/ICA)
- 2015–2022 Affiliate Member of the IEEE Signal Processing Theory and Methods Technical Committee (*SPTM TC*)
- 2014 Program committee member of the 24th IEEE International Workshop on Machine Learning for Signal Processing (MLSP)
- 2015, 2017, 2018 Technical program committee member of the 23rd, 25th, and 26th European Signal Processing Conference (EUSIPCO)
- 2020, 2021 Technical program committee member of the 2020 IEEE Statistical Signal Processing Workshop (SSP)

ORGANIZER OF SPECIAL SESSIONS AND MINISYMPOSIA IN INTERNATIONAL CONFERENCES

- 2018 Organizer of a minisymposium "*Coupled matrix and tensor decompositions: Theory and methods*", in the Society for Industrial and Applied Mathematics (SIAM) Conference on Applied Linear Algebra (SIAM-ALA18)
- 2015 Co-organizer of a minisymposium "*Matrix and Tensor Decompositions and Applications*", with Mariya Ishteva and Carmeliza Navasca, in the Society for Industrial and Applied Mathematics (SIAM) Conference on Applied Linear Algebra (SIAM LA15)
- 2015 Lead organizer of a special session "*Joint Analysis of Multiple Datasets, Data Fusion and Related Topics*", with Christian Jutten, in the 12th International Conference on Latent Variable Analysis and Signal Separation (LVA/ICA 2015)
- 2014 Lead organizer of a special session "*Signal processing for multimodal data*", with Christian Jutten and Tülay Adalı, in the European Signal Processing Conference (EUSIPCO 2014)

OTHER ACTIVITIES WITHIN THE ACADEMIC COMMUNITY

- 2022–2024 IEEE SPS Women in Signal Processing Subcommittee Member (Diversity and Inclusion-Benefits and Services Subcommittee)

REVIEWER

- Journals: SIAM Journal on Imaging Sciences (SIIMS), IEEE Transactions on Signal Processing, IEEE Signal Processing Letters, Elsevier Signal Processing, Elsevier Digital Signal Processing, Springer Behavior Research Methods, The Journal of Machine Learning Research (JMLR), Springer Journal of Scientific Computing.
- Conferences: IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), European Signal Processing Conference (EUSIPCO), IEEE International Workshop on Machine Learning for Signal Processing (MLSP), International Conference on Latent Variable Analysis and Signal Separation (LVA/ICA), IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM), IEEE International Workshop on Computational

Advances in Multi-Sensor Adaptive Processing (CAMSAP), IEEE Statistical Signal Processing Workshop (SSP), Symposium on Signal and Image Processing of the French-Speaking Community (Colloque du Groupe d'Etudes du Traitement du Signal, GRETSI)

TUTORIAL

A 3-hour course on “Data Fusion: Benefits of Fully Exploiting Diversity”, with Tülay Adalı and Christian Jutten, European Signal Processing Conference (EUSIPCO), Budapest, Hungary, August, 2016.

PUBLICATIONS

JOURNAL (PEER-REVIEWED)

- JO-7 **D. Lahat**, Y. Lang, V. Y. F. Tan, and C. Févotte. Positive Semidefinite Matrix Factorization: A Connection with Phase Retrieval and Affine Rank Minimization. *IEEE Transactions on Signal Processing*, Vol. 69, pp. 3059–3074, 2021. [\[paper\]](#).
- JO-6 **D. Lahat**, C. Jutten, and H. Shapiro. Schur's lemma for coupled reducibility and coupled normality. *SIAM Journal on Matrix Analysis and Applications (SIMAX)*, Vol. 40, No. 3, 2019, pp. 998–1021. [\[paper\]](#)
- JO-5 **D. Lahat** and C. Jutten. Joint independent subspace analysis: uniqueness and identifiability. *IEEE Transactions on Signal Processing*, Vol. 67, No. 3, February 2019, pp. 684–699. [\[paper\]](#)
- JO-4 **D. Lahat** and C. Jutten. Joint independent subspace analysis using second-order statistics. *IEEE Transactions on Signal Processing*, Vol. 64, No. 18, September 2016, pp. 4891–4904. [\[paper\]](#)
- JO-3 **D. Lahat**, T. Adalı and C. Jutten. Multimodal data fusion: an overview of methods, challenges and prospects. *Proceedings of the IEEE*, Vol. 103, No. 9, September 2015, pp. 1449–1477. [\[paper\]](#)
- JO-2 **D. Lahat**, J.-F. Cardoso, and H. Messer. Blind separation of multidimensional components via subspace decomposition: performance analysis. *IEEE Transactions on Signal Processing*, Vol. 62, No. 11, June 2014, pp. 2894–2905. [\[paper\]](#)
- JO-1 **D. Lahat**, J.-F. Cardoso, and H. Messer. Second-order multidimensional ICA: performance analysis. *IEEE Transactions on Signal Processing*, Vol. 60, No. 9, September 2012, pp. 4598–4610. [\[paper\]](#)

CONFERENCE (PEER-REVIEWED PAPER IN CONFERENCE PROCEEDINGS)

- CO-15 **D. Lahat** and C. Févotte. Positive semidefinite matrix factorization based on truncated Wirtinger flow. The 2020 28th European Signal Processing Conference (EUSIPCO), pp. 1035–1039, Amsterdam, The Netherlands, January 2021. [\[paper\]](#)
- CO-14 **D. Lahat** and C. Févotte. Positive semidefinite matrix factorization: A link to phase retrieval and a block gradient algorithm. 45th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Barcelona, Spain, May 4–8, 2020. [\[paper\]](#)
- CO-13 **D. Lahat** and C. Jutten. A New link between joint blind source separation using second order statistics and the canonical polyadic decomposition. 14th International Conference on Latent Variable Analysis and Signal Separation (LVA/ICA), Guildford, UK, July 2018. [\[paper\]](#)
- CO-12 **D. Lahat** and C. Jutten. Joint independent subspace analysis by coupled block decomposition: non-identifiable cases. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Calgary, Canada, April 2018. [\[paper\]](#)
- CO-11 **D. Lahat** and C. Jutten. Joint analysis of multiple datasets by cross-cumulant tensor (block) diagonalization. The Ninth IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM), Rio de Janeiro, Brazil, July 2016. [\[paper\]](#)

- CO-10 **D. Lahat** and C. Jutten. An alternative proof for the identifiability of independent vector analysis using second order statistics. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Shanghai, China, March 2016. [\[paper\]](#)
- CO-9 **D. Lahat** and C. Jutten. Joint independent subspace analysis: a quasi-Newton algorithm. 12th International Conference on Latent Variable Analysis and Signal Separation (LVA/ICA), Liberec, Czech Republic, August 2015, pp. 111–118 [\[paper\]](#).
- CO-8 **D. Lahat** and C. Jutten. Joint blind source separation of multidimensional components: model and algorithm. European Signal Processing Conference (EUSIPCO), Lisbon, Portugal, September 2014, pp. 1417–1421 [\[paper\]](#)
- CO-7 **D. Lahat**, T. Adalı and C. Jutten. Challenges in multimodal data fusion. European Signal Processing Conference (EUSIPCO), Lisbon, Portugal, September 2014, pp. 101–105. [\[paper\]](#)
- CO-6 **D. Lahat**, J.-F. Cardoso, and H. Messer. Identifiability of second-order multidimensional ICA. European Signal Processing Conference (EUSIPCO), Bucharest, Romania, August 27–31, 2012. [\[paper\]](#)
- CO-5 **D. Lahat**, J.-F. Cardoso, and H. Messer. Joint block diagonalization algorithms for optimal separation of multidimensional components. In Latent Variable Analysis and Signal Separation, ser. LNCS, F. Theis, A. Cichocki, A. Yeredor, and M. Zibulevsky, Eds., vol. 7191. Heidelberg: Springer, 2012, pp. 155–162. [\[paper\]](#)
- CO-4 **D. Lahat**, J.-F. Cardoso, M. Le Jeune and H. Messer. Multidimensional ICA and its performance analysis, applied to CMB observations. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Prague, Czech Republic, May 22–27, 2011. [\[paper\]](#) [\[video\]](#)
- CO-3 **D. Lahat**, J.-F. Cardoso and H. Messer. ICA of correlated sources mismodeled as uncorrelated: performance analysis. IEEE Workshop on Statistical Signal Processing (SSP), Cardiff, Wales, UK. 31 August–3 September 2009. [\[paper\]](#)
- CO-2 **D. Lahat**, J.-F. Cardoso and H. Messer. Optimal performance of second-order multidimensional ICA. In T. Adalı, C. Jutten, J. M. T. Romano, and A. K. Barros, Eds., Independent Component Analysis and Signal Separation, pages 50–57. Springer, 2009. [\[paper\]](#)
- CO-1 **D. Lahat** and A. J. Weiss. Performance analysis of a blind HOS separation criterion. In Proc. IEEE 23rd Convention of Electrical and Electronics Engineers in Israel, Herzliya, Israel, September 2004, pp. 396–399. [\[paper\]](#)

TALKS IN CONFERENCES WITHOUT PROCEEDINGS

- TA-10 **D. Lahat**. Multimodal Data Fusion: An Overview of Methods, Challenges and Prospects. [The Second International Israel Data Science Initiative Conference \(IDSII\)](#), Ein-Gedi, Israel, January 2023.
- TA-9 **D. Lahat**, Y. Lang, V. Y. F. Tan, and C. Févotte. Positive semidefinite matrix factorization: a connection with phase retrieval and new algorithms. [SIAM Conference on Applied Linear Algebra \(SIAM LA21\)](#), New Orleans, LA, USA, May 2021 (virtual format). [\[abstract\]](#)
- TA-8 **D. Lahat** and C. Jutten. Tensor and Coupled Decompositions in Block Terms: Uniqueness and Irreducibility. [Signal Processing with Adaptive Sparse Structured Representations \(SPARS\)](#), Toulouse, France, July 2019. [\[extended abstract\]](#) [\[poster \(see supplementary material in this link\)\]](#) <https://hal.science/hal-02397453>
- TA-7 **D. Lahat** and C. Jutten. Tensor and coupled decompositions in block terms: Some results on uniqueness and irreducibility. [GdR ISIS meeting: Nouvelles méthodes tensorielles et applications \(New tensor methods and applications\)](#), Ivry-sur-Seine, France, June 2019

- TA-6 **D. Lahat** and C. Jutten. Decompositions in Sum of Low-rank Block Terms: Can Block Size be Considered as a Type of Diversity. *SIAM Annual Meeting (SIAM AN18)*, Portland, Oregon, USA, July 2018
- TA-5 **D. Lahat** and C. Jutten. Tensor and coupled decompositions in block terms: uniqueness and irreducibility. *TRICAP 2018, the 8th edition of the multidisciplinary conference on ThRee-way methods In Chemistry And Psychology (and other areas)*, Angel Fire Resort, New Mexico, USA, June 2018. [presentation (see supplementary material in this link)] <https://hal.science/hal-04024260>
- TA-4 **D. Lahat** and C. Jutten. Understanding the uniqueness of decompositions in low-rank block terms using Schur's lemma on irreducible representations. *SIAM Conference on Applied Linear Algebra (SIAM-ALA18)*, Hong Kong, May 2018.
- TA-3 **D. Lahat** and C. Jutten. On the uniqueness of coupled matrix block diagonalization in the joint analysis of multiple datasets. *SIAM Conference on Applied Linear Algebra (SIAM LA15)*, Atlanta, Georgia, USA, October 2015.
- TA-2 A. Taub, M. Mintz, A. Magal, **D. Lahat**, H. Messer, M. Marcus-Kalish, and Y. Shacham. Brain-machine hybrid for the rehabilitation of a discrete motor learning function. The Nano2Life annual meeting, Champéry, Switzerland, January 2008.
- TA-1 A. Taub, M. Mintz, **D. Lahat**, H. Messer, M. Oksman, M. Marcus-Kalish, and Y. Shacham. Brain-machine hybrid for the rehabilitation of a discrete motor learning function. The Center for Complexity Science meeting, Bar-Ilan University, Ramat-Gan, Israel, February 15th 2007.

INVITED TALKS, NOT IN CONFERENCES

“Beyond independent component analysis: Subspace, coupled, and block decompositions”

EEL Colloquium, Lehrstuhl für Multimediakommunikation und Signalverarbeitung, Faculty of Engineering, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany, July 14, 2022. [link]

Brain Space Initiative (BSI), #BSIsubspace The talk series is sponsored and promoted by the IEEE Signal Processing Society. Virtual Talk, Wednesday, June 30, 2021. [video]

“Diversity and uniqueness in coupled decompositions”,

INP-ENSEEIH, Toulouse, France, February 2018.

SIMULA, Fornebu, Norway, February 2018

“Joint independent subspace analysis: when blind source separation and data fusion meet”,

IRISA / INRIA Rennes Bretagne Atlantique, Rennes, France, December 2015.

IDeAS Seminar at the Program in Applied and Computational Mathematics (PACM), Princeton University, NJ, USA, November 2015.

Seminar at the Applied Mathematics Program, Yale University, New Haven, CT, USA, November 2015.

“Challenges in multimodal data fusion and multiset data analysis”,

ETIS-ENSEA, Cergy-Pontoise, France, June 2014.

“Second-order multidimensional ICA: theory and methods”,

Séminaire CRAN, Centre de Recherche en Automatique de Nancy, Nancy, France, December 2012.

Séminaire INRIA, Université Rennes 1, Rennes, France, December 2012.

Institute of Bioinformatics and Systems Biology, Helmholtz Zentrum München, Germany, November 2012.

GIPSA-Lab seminar, Grenoble Campus, Saint-Martin-d'Hères, France, November 2012.

Séminaire du Pôle SIS (Signal, Images et Systèmes), Laboratoire d'Informatique, Signaux et Systèmes de Sophia-Antipolis, France, November 2012.

SISTA Seminar, KU Leuven, Leuven, Belgium, September 2012. [[link to event](#)]

SCIENTIFIC SOFTWARE

1. Positive semidefinite matrix factorization (PSDMF), <https://github.com/Dana-L/PSDMF> and <https://dana.lahat.org.il/psdmf.html>, Matlab (with Yanbin Lang, Vincent Y. F. Tan, and Cédric Févotte)
 2. Joint block diagonalization (JBD) of a weighted set of positive-definite symmetric matrices, <https://www.irit.fr/~Dana.Lahat/jbd.zip>, Matlab (with Jean-François Cardoso)
 3. Joint blind source separation (JBSS) of multidimensional components by coupled matrix block diagonalization and tensor block term decomposition (BTD), Matlab (main developer), available upon request
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PROGRAMMING SKILLS AND COMPETENCES

MATLAB

LANGUAGES

English–fluent, French–advanced, Hebrew–native speaker