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Education

2000-2005 *ETH Zürich, Switzerland*
PhD. in Electrical Engineering, December 2005, Advisor: Prof. Dr. Hans-Andrea Loeliger.

1999-2000 *ETH Zürich, Switzerland*
Exchange Student (Erasmus Program).
Training in Neuroscience (Computational and Biological Learning and Signal Processing) at the Institute of Neuroinformatics, Zürich.
Diploma Thesis: *Self-Supervised Learning of Hierarchies*.
Involved the implementation of a biologically inspired learning rule on an analog chip.
Supervisors: Prof. Dr. P. König and Dr. K. Körding (Institute of Neuroinformatics)

1995-2000 *Ghent University*
Diploma in Engineering Physics (Great Distinction). Training in Applied and Theoretical Physics.

Experience

May '09 – present *Laboratory for Information and Decision Systems, MIT, Cambridge, MA*
Research Scientist (host: Prof. Dr. A. Willsky).

Jan '09 – May '09 *Laboratory for Information and Decision Systems, MIT, Cambridge, MA*
Post-Doctoral Associate (host: Prof. Dr. A. Willsky).

Jan '08 – Dec' 08 *Laboratory for Information and Decision Systems, MIT, Cambridge, MA*
Post-Doctoral Fellow (host: Prof. Dr. A. Willsky).

Mar '07 – Dec '07 *Amari Research Unit, RIKEN BSI, Saitama, Japan*
Research Scientist (host: Prof. Dr. S-I. Amari).

Apr '06 – Febr '07 *Amari Research Unit, RIKEN BSI, Saitama, Japan*
JSPS Post-Doctoral Fellow (host: Prof. Dr. S-I. Amari).

Jan – Mar '06 *Amari Research Unit, RIKEN BSI, Saitama, Japan*
Visiting Research Scientist (host: Prof. Dr. S-I. Amari).

2000 - 2005 *Signal and Information Processing Laboratory, ETH Zürich, Switzerland*
Teaching and Research Assistant for Prof. Dr. Hans-Andrea Loeliger.
Activities include teaching assistance for several courses, supervision of various student and industry projects, and reviewing for several conferences and journals.

Spring 2004 *Mitsubishi Electric Research Lab, Cambridge, MA, USA*
Researcher under Dr. J. Yedidia. We investigated the connection between "generalized belief propagation" and "structured summary propagation" and applied such algorithms to problems in statistical physics. We designed algorithms for decoding so-called transform codes and utilized those algorithms for error correction and compression.

Jan 2004 *Digital Communications Laboratory, Ghent University, Belgium*
Researcher under Prof. Dr. M. Moeneclaey. We compared sum-product based to EM-based iterative inference algorithms; we developed such algorithms for carrier phase synchronization.

Fall 2003 *Media Laboratory, Massachusetts Institute of Technology, Cambridge, MA, USA*
Researcher under Prof. Dr. N. Gershenfeld (Physics and Media, CBA). Investigated the possibility of implementing inference-algorithms on an NMR-Quantum Computer as well as in aVLSI.

Spring 1999 *Fluid Mechanics Laboratory, Ghent University, Belgium*
Researcher under Prof. Dr. ir. E. Dick (Fluid Mechanics Lab) and Prof. Dr. ir. C. Leys (Applied Physics Lab). Did finite element analysis of the flow in CO_2-lasers.

Fall 1998 — *Applied Physics Laboratory, Ghent University, Belgium*
Researcher under Prof. Dr. ir. W. Wieme. Theoretical study of Bose-Einstein Condensation.

Summer '95, '96, '97, '98, '99 — *Arcelor Ghent (Sidmar), Belgium*
Internships (administrative and engineering projects; partly financed my university studies)

Research

General research interest:
Design and analysis of statistical inference algorithms operating on graphical models (factor graphs) for applications in computational neuroscience, applied information theory, and digital communications. Implementation in software and hardware.

Current research topic:
Design and analysis of statistical inference algorithms for analyzing (i) EEG signals; (ii) electrophysiological recordings (spike data); (iii) molecular imaging data.

Skills

Mathematical Modeling, Machine Learning (Monte-Carlo Methods, Information Geometry, Kernel Machines, Neural Networks and Graphical Models), Signal Processing, Applied Information Theory, Communications Theory, Theoretical Statistics (Higher-order Estimation Theory, Small-Sample Theory), Numerical Methods, Computational Neuroscience (modeling of EEG, molecular imaging, and spike data), Experienced in Measuring EEG (GTec system).

Programming languages: Pascal, Basic, C, C++, Assembler, Python, and Matlab.

Experienced in using TEX for scientific document typesetting. Some HTML/Javascript experience. Routine use of Windows and UNIX variants.

Languages: Dutch (mother tongue); Fluent in French, English, German and Italian; Familiar with Spanish.

Teaching

Teaching Assistant for *Adaptive Filters and Neural Networks* at ETH Zurich (Winter '00, '01 and '02).

Teaching Assistant for *Digital Signal Processing* at ETH Zurich (Winter '01).

Teacher of *Practical Signal Processing with DSPs* at ETH Zurich (Summer '01).

Teaching Assistant for *Algebra, Codes and Signal Processing* at ETH Zurich (Summer '02).

Guest Lecturer in the course *Adaptive Filters and Neural Networks* at ETH Zurich (Winter '02).

Guest Lecturer in the course *Algebra, Codes and Signal Processing* at ETH Zurich (Summer '04).

Supervised Student Projects (Undergraduate/Graduate/Post-Graduate) and Internships

- *Non-parametric models for non-negative matrix factorization*,
  Vincent Tan, PhD. project, MIT, MA, Nov. 2008-present, supervised together with Prof. Alan Willsky.
- *Dimensionality reduction methods for classification*,
  Kush Varshney, PhD. project, MIT, MA, Nov. 2008-present, supervised together with Prof. Alan Willsky.
- *Level set methods for classification*,
  Kush Varshney, PhD. project, MIT, MA, Nov. 2008-present, supervised together with Prof. Alan Willsky.
- *Multi-variate stochastic event synchrony*,
  Theophane Weber (MIT, MA, USA), Internship at RIKEN BSI, Fall 2007, supervised together with Prof. Andrzej Cichocki.
- *Pattern recognition in weather data,*
  Moritz Ritter, Diploma Project, ETH Zurich, 2001.
- *Prediction of extreme weather events by neural networks and information theory,*
  Siegfried Leimgruber, Diploma Project, ETH Zurich, 2002.
- *Adaptive algorithms for smart fire detection,*
  Max Schlegel, Post-Graduate Project, ETH Zurich, 2002 (in collaboration with Siemens AG).
- *Information theory and neural networks: limits of local weather prediction,*
  Michael Weber, Diploma Project, ETH Zurich, 2002.
- *Continuous-time synchronization,*
  Tobias Koch, Semester Project, ETH Zurich, 2003.
- *Detection of rare events: a comparison of various methods,*
  Simon Schilling, Semester Project, ETH Zurich, 2003.
- *Signal processing in wearable computing systems using factor graphs,*
  Wim Meerschman, Diploma Project, ETH Zurich and Ghent University, 2003.
- *Application of generalized belief propagation to LFSR state estimation,*
  Vedran Galijas, Semester Project, ETH Zurich, 2004.
- *Numerical techniques for computing capacities of communications channels with memory*,
  Oliver Nagy, Semester Project, ETH Zurich, 2005.
- *Multi-variate stochastic event synchrony*,
  Theophane Weber (MIT, MA, USA), Internship at RIKEN BSI, Fall 2007.

Services

Reviewer for various international conferences, symposia and journals on communications theory, coding theory, information theory, signal processing, machine learning, and computational neuroscience.

Session Chair for the *Sensor Networks* Session at *2006 IEEE Int. Symp. on Information Theory and its Applications (ISITA),* Seoul, South-Korea, Oct. 29–Nov. 1, 2006.

Member Technical Program Committee, *5th International Symposium on Turbo Codes & Related Topics,* EPFL, Lausanne, Switzerland, Sept. 2-5, 2008.

Member Technical Program Committee, *Information and Coding Theory Symposium of ChinaCom 2008,* August 25–27, Hangzhou, China.

Track Chair, *7th Mexican International Conference on Artificial Intelligence,* October 27–31, 2008, Mexico City, Mexico.

Member Technical Program Committee, *WSC 2008 Online World Conference on Soft Computing in Industrial Applications,* November 10–21, 2008.

Member Technical Program Committee, *15th International Conference on Neural Information Processing,* November 25–28, 2008, Auckland, New Zealand.

Member Technical Program Committee, *8th International Conference on Independent Component Analysis and Signal Separation,* Paraty, Brazil March 15-18, 2009.

Member Technical Program Committee, *Information and Coding Theory Symposium of ChinaCom 2009,* Hangzhou, China.

Member Technical Program Committee, *8th Mexican International Conference on Artificial Intelligence,* November 9–13, 2009, Guanajuato, Mexico.

Member Technical Program Committee, *16th International Conference on Neural Information Processing,* December 1–5, 2009, Bangkok, Thailand.

Member Technical Program Committee, NIPS Workshop (Neural Information Processing Systems) *Connectivity Inference in Neuroimaging,* December 11–12, 2009, Whistler, Canada.

Member Technical Program Committee, *WSC 2009 Online World Conference on Soft Computing in Industrial Applications,* November 17–29, 2009.

Member Technical Program Committee, *20th International Conference on Pattern Recognition (ICPR),* 23–26 August, 2010, Turkey, Istanbul.

Member Technical Program Committee, *2010 IEEE World Congress on Computational Intelligence,* 18–23 July, 2010, Barcelona, Spain.

Co-Chair for the *Neural Signal Processing* Session at *Proc. 31th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC09).*

Co-organizer Special Session, *Neural dynamics of brain disorders*, 2nd International Conference on Cognitive Neurodynamics 2009 (ICCN'09), Hangzhou, P.R. China, November 15–19, 2009.

Organizer Special Session, *Multivariate Analysis of Brain Signals: Methods and Applications*, 2010 IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2010, Dallas, Texas, USA, March 15–19, 2010.

Co-Organizer Special Session, *Machine Learning Methods for Analyzing Brain Signals*, BioSignals 2010, Valencia, Spain, January 20–23, 2010.

Associate Editor, *Computational Intelligence and Neuroscience (CIN)*, Hindawi Publishing Corporation, Jan 2009–present (no Impact Factor yet, since CIN was established in 2007).

Membership

IEEE (Institute of Electrical and Electronics Engineers)
Communications Society, Information Theory Society, Signal Processing Society, Computational Intelligence Society

IEICE (Institute of Electronics, Information, Communication Engineers)
Communications Society

IMS (Institute of Mathematical Statistics)

Alumni Association of ETH Zurich.

Awards

2010	Invitation Fellowship from the Japanese Society for the Promotion of Science (JSPS).
2008	Travel Award, Engineering in Medicine and Biology Conference (EMBC 2008).
2007	Henri-Benedictus Fellowship of the King Baudouin Foundation. (One of two recipients; award ceremony honored by Princess Astrid, Princess of Belgium.)
2007	Fellowship of the Belgian American Educational Foundation.
2007	Travel Award, Neural Information Processing Conference (NIPS 2007).
2006	Best Student Paper Award at the International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2006).
2006–2007	Post-doctoral Fellowship from the Japanese Society for the Promotion of Science (JSPS).
2003–2004	One-year research grant from the Swiss National Science Foundation (jointly with Prof. Dr. H.-A. Loeliger).
2002	Karolus Foundation travel grant for a three-month research stay at the Massachusetts Institute of Technology, MA, USA.
1999–2000	Grant from ETH Zurich for Erasmus exchange year.
1995	Winner of Rotary essay competition.

Journals

B. Kurkoski and J. Dauwels, "Iterative decoding of lattice codes using Gaussian mixtures," *IEEE Communications Letters*, in press.

J. Dauwels, F. Vialatte, T. Weber, and A. Cichocki, "Early Diagnosis of Alzheimer's Disease from EEG Signals: Where Are We Standing?," *Current Alzheimer's Research,* in press (invited review paper).

F. Vialatte, M. Maurice, J. Dauwels, and A. Cichocki, "SSVEP useful paradigms in neuroscience, and potential applications in BCI: open questions and challenges," *Current Progress in Neurobiology,* in press (invited review paper).

F. Vialatte, J. Dauwels, M. Maurice, and A. Cichocki, "Steady-state visually evoked potentials: time-frequency analysis and oscillatory event synchrony," *Cognitive Neurodynamics,* in press.

F. Vialatte, J. Sole-Casals, J. Dauwels, M. Maurice, and A. Cichocki, "Bump Time-Frequency Toolbox: a Toolbox for Time-Frequency Oscillatory Bursts Extraction in Electrophysiological Signals," *BMC Neuroscience,* in press.

J. Dauwels, F. Vialatte, M. Vialatte, and A. Cichocki, "A Comparative Study of Synchrony Measures for the Early Diagnosis of Alzheimer's Disease Based on EEG," *NeuroImage,* in press.

J. Dauwels, F. Vialatte, T. Weber, and A. Cichocki, "Quantifying Statistical Interdependence by Message Passing on Graphs: I. One-Dimensional Point Processes," *Neural Computation* 21:8, in press.

J. Dauwels, F. Vialatte, T. Weber, T. Musha, and A. Cichocki, "Quantifying Statistical Interdependence by Message Passing on Graphs: II. Multi-Dimensional Point Processes," *Neural Computation* 21:8, in press.

J. Dauwels, and H.-A. Loeliger, "Computing information rates of continuous channels with memory by particle methods," *IEEE Transactions on Information Theory,* vol. 54, no. 1, pp. 406–409, Jan. 2008.

H.-A. Loeliger, J. Dauwels, J. Hu, Li Ping, S. Korl, and F. Kschischang, "The factor graph approach to model-based signal processing," *Proc. of the IEEE*, vol. 95, no. 6, pp. 1295–1322, June 2007 (invited paper).

B. Vigoda, J. Dauwels, N. Gershenfeld, and H.-A. Loeliger, "Synchronization of pseudo-random signals by forward-only message passing with application to electronic circuits," *IEEE Trans. Inform. Theory,* vol. 52, no. 8, pp. 3843–3852, August 2006.

Book Chapters

J. Dauwels, H. Wymeersch, H.-A. Loeliger and M. Moeneclaey, "Phase Estimation and Phase Ambiguity Resolution by Message Passing," Lecture Notes in Computer Science, vol. 3124, 2004.

J. Dauwels, F. Vialatte, and A. Cichocki, "A Comparative Study of Synchrony Measures for the Early Detection of Alzheimer's Disease Based on EEG," Lecture Notes in Computer Science, vol. 4985, Neural Information Processing, Springer, June 2008.

J. Dauwels, F. Vialatte, T. Rutkowski, and A. Cichocki, "Measuring Neural Synchrony by Message passing," *Advances in Neural Information Processing Systems Conference (NIPS)*, 2007.

F. Vialatte, J. Dauwels, T. Rutkowski, and A. Cichocki, "Oscillatory Event Synchrony during Steady State Visually Evoked Potentials," *Advances in Cognitive Neurodynamics,* Springer, October 2008 (invited).

J. Dauwels, F.Vialatte, and A. Cichocki, "On the Early Diagnosis of Alzheimer's Disease from EEG Signals: A Mini-Review," *Advances in Cognitive Neurodynamics,* in press.

F. Vialatte, J. Sole-Casals, A. Hazart, D. Prvulovic, J. Dauwels, J. Pantel, and C. Haenschel, "Modeling transient oscillations in the EEG of patients with mild cognitive impairment," *Advances in Cognitive Neurodynamics,* in press.

J. Dauwels, F. Vialatte, T. Weber, and A. Cichocki, "On similarity measures for spike trains," *Lecture Notes in Computer Science*, vol. 5506, in press.

J. Dauwels, F. Vialatte, T. Weber, and A. Cichocki, "An Exemplar-Based Statistical Model for the Dynamics of Neural Synchrony," *Lecture Notes in Computer Science*, vol. 5506, in press.

J. Dauwels, Y. Tsukada, Y. Sakumura, S. Ishii, F. Vialatte, and A. Cichocki, "On the synchrony of morphological and molecular signaling events in cell migration," *Lecture Notes in Computer Science*, vol. 5506, in press.

F. Vialatte, J. Dauwels, J. Sole-Casals, M. Maurice and A. Cichocki, "Improved Sparse Bump Modeling for Electrophysiological Data," *Lecture Notes in Computer Science*, vol. 5506, in press.

F. Vialatte, M. Maurice, J. Dauwels, and A. Cichocki, "Steady State Visual Evoked Potentials in the Delta Range (0.5-5 Hz)," *Lecture Notes in Computer Science*, vol. 5506, in press.

Reviewed Proceedings

J. Dauwels, F. Vialatte, C. Latchoumane, J. Jeong, and A. Cichocki, "Loss of EEG Synchrony in Early-Stage AD patients: a Study with Multiple Synchrony Measures and Multiple EEG Data Sets," *Proc. 31th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC09),* (invited paper), to appear.

J. Dauwels, S. Cash, and E. Eskandar, "Localization of Seizure Onset Area from Intracranial Non-Seizure EEG by Exploiting Locally Enhanced Synchrony," *Proc. 31th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC09),* to appear.

B. Kurkoski and J. Dauwels, "Power-constrained communications using LDLC lattices," *Proc. IEEE Int. Symp. on Information Theory (ISIT 2009),* to appear.

J. Dauwels, T. Weber, F. Vialatte, and A. Cichocki, "Analyzing brain signals by combinatorial optimization," *Forty-Sixth Annual Allerton Conference on Communication, Control, and Computing,* September 23–26, 2008, Allerton Retreat Center, Monticello, Illinois (invited paper).

J. Dauwels, T. Weber, F. Vialatte, and A. Cichocki, "Stochastic Synchrony, Application to Neural Signals and Early Prediction of Alzheimer's Disease," *Proceedings of the 3rd INFORMS Workshop on Data Mining and Health Informatics (DM-HI 2008) J. Li, D. Aleman, R. Sikora, eds.*, to appear.

J. Dauwels, T. Weber, F. Vialatte, and A. Cichocki, "Quantifying the Similarity of Multiple Multi-Dimensional Point Processes by Integer Programming with Application to Early Diagnosis of Alzheimer's Disease from EEG," *Proc. 30th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC08),* to appear.

B. Kurkoski and J. Dauwels, "Gaussian mixture reduction by L_2-norm minimization, with applications to lattice decoding," *Proc. IEEE Int. Symp. on Information Theory (ISIT 2008),* to appear.

J. Dauwels, T. Rutkowski, F. Vialatte, and A. Cichocki, "On the Synchrony of Empirical Mode Decompositions with Application to EEG," *Proc. IEEE Int. Conf. on Acoustics and Signal Processing (ICASSP),* 2008, to appear.

J. Dauwels, F. Vialatte, T. Rutkowski, and A. Cichocki, "Machine Learning Methods for Exploring EEG Dynamics," *NIPS Workshop on Large-Scale Brain Dynamics*, 2007.

T. Rutkowski, J. Dauwels, F. Vialatte, and A. Cichocki, "Time-Frequency and Synchrony Analysis of Responses to Steady-state Auditory and Musical Stimuli from Multichannel EEG," *NIPS Workshop on Music, Brain and Cognition*, 2007.

J. Dauwels, "On convergence and stability properties of decision-based inference algorithms on general graphs," *Proc. IEEE Int. Symp. Information Theory (ISIT),* 2007.

J. Dauwels, "On variational message passing on factor graphs," *Proc. IEEE Int. Symp. Information Theory (ISIT),* 2007.

J. Dauwels, F. Vialatte, and A. Cichocki, "A Novel Measure for Synchrony and Its Application to Neural Signals", *Proc. IEEE Int. Conf. on Acoustics and Signal Processing (ICASSP),* 2007 (invited paper).

J. Dauwels, "An algorithm to improve and validate Cramér-Rao Bounds through the fibre bundle theory of local exponential families," *Proc. IEEE Int. Conf. on Acoustics and Signal Processing (ICASSP),* 2007.

J. Dauwels, "Improving and validating Cramér-Rao bounds through higher-order asymptotic estimation theory: a case study," *Proc. 2006 IEEE Int. Symp. on Information Theory and its Applications (ISITA)*, Seoul, South-Korea, Oct. 29–Nov. 1, 2006.

J. Hu, H.-A. Loeliger, J. Dauwels, and F. Kschischang, "A general computation rule for lossy summaries/messages with examples from equalization," *Proc. 44th Allerton Conf. on Communication, Control, and Computing,* Monticello, Illinois, Sept. 27–29, 2006, (invited paper).

J. Dauwels and S. Korl, "A numerical method to compute Cramér-Rao-type bounds for challenging estimation problems," *Proc. of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2006),* Toulouse, France, May 15–19, 2006, pp. 717–720 (Best Student Paper Award)

J. Dauwels, S. Korl, and H.-A. Loeliger, "Particle methods as message passing," *Proc. 2006 IEEE Int. Symp. on Information Theory,* Seattle, USA, July 9–14, 2006, pp. 2052–2056.

J. Dauwels, *Numerical computation of the capacity of continuous memoryless channels,* Proc. of the 26th Symposium on Information Theory in the BENELUX, 2005.

T. Ott, J. Dauwels, and R. Stoop, *Sequential clustering by loopy belief propagation,* Proc. of the European Conference on Circuit Theory and Design, 2005.

J. Dauwels, S. Korl, and H.-A. Loeliger, *Expectation maximization for phase estimation,* Proc. of the Eighth International Symposium on Communication Theory and Applications, 2005.

J. Dauwels, S. Korl, and H.-A. Loeliger, *Steepest descent on factor graphs,* Proc. of the IEEE ITSOC Information Theory Workshop 2005 on Coding and Complexity.

J. Dauwels, S. Korl, and H.-A. Loeliger, *Expectation maximization on factor graphs,* Proc. of the IEEE Int. Symp. Information Theory, 2005.

J. Dauwels, *Computing Bayesian Cramér-Rao bounds,* Proc. of the IEEE Int. Symp. Information Theory, 2005.

J. Dauwels, H.-A. Loeliger, P. Merkli, and M. Ostojic, *On Markov structured summary propagation and LFSR synchronization,* Proc. 42nd Allerton Conf. on Communication, Control, and Computing, (Allerton House, Monticello, Illinois), Sept. 29 – Oct. 1, 2004. (invited paper)

J. Dauwels, H. Wymeersch, H.-A. Loeliger and M. Moeneclaey, *Phase Estimation and Phase Ambiguity Resolution by Message Passing,* Proc. 11th International Conference on Telecommunications and Networking, pp. 150–155, Fortaleza, Brazil, August 1–6, 2004.

J. Dauwels and H.-A. Loeliger, *Computation of Information Rates by Particle Methods,* Proc. 2004 IEEE International Symposium on Information Theory, p. 178, Chicago, USA, June 27–July 2, 2004.

J. Dauwels and H.-A. Loeliger, *Phase Estimation by Message Passing,* Proc. 2004 IEEE Int. Conf. on Communications, pp. 523–527, Paris, June 20–24, 2004

H.-A. Loeliger, J. Dauwels, V. M. Koch, S. Korl, *Signal processing with factor graphs: examples,* First International Symposium on Control, Communications and Signal Processing (ISCCSP 2004), Hammamet, Tunisia, March 21–24, 2004. (invited paper)

J. Dauwels, H.-A. Loeliger, P. Merkli, and M. Ostojic, *On Structured-Summary Propagation, LFSR Synchronization, and Low-Complexity Trellis Decoding,* Proc. 41st Allerton Conf. on Communication, Control, and Computing, (Allerton House, Monticello, Illinois), Oct. 1–3, 2003. (invited paper)

J. Dauwels and H.-A. Loeliger, *Joint Decoding and Phase Estimation: an Exercise in Factor Graphs,* Proc. 2003 IEEE Int. Symp. Information Theory, p. 231, Yokohama, Japan, June 29 – July 4 , 2003.

Other

F. Vialatte, M. Maurice, J. Dauwels, and A. Cichocki, HEEG virtual electrodes for synchrony measures OHBM meeting, Melbourne, Australia, June 15–19 2008. Neuroimage, 41(S1):S142.

B. Kurkoski and J. Dauwels, "Message-passing decoding of lattices using Gaussian mixtures," *Proc. 30th Symposium on Information Theory and its Applications (SITA 2007), Kashikojima, Mie, Japan*, Nov. 27–30, 2007.

J. Dauwels, F. Vialatte, and A. Cichocki, "On a novel measure for synchrony and its application to EEG," *Neuroscience Research,* 58:185, 2007.

H.-A. Loeliger, J. Dauwels, S. Korl, and J. Hu, "The factor graph approach to signal processing: a progress report," *Information Theory and Applications Workshop,* UCSD, San Diego, Jan 29–Feb 2, 2007.

J. Dauwels and F. Vialatte, "Quantifying the synchrony between two event strings by performing inference in a probabilistic model", *Proc. IEICE Neuro-Computing Workshop,* Nara, Japan, Oct. 11, 2006.

J. Dauwels, "On variational message passing and its relation to other message passing inference algorithms", *Proc. IEICE Neuro-Computing Workshop,* Toyohashi, Japan, Dec. 5, 2006.

J. Dauwels and F. Vialatte, "Quantifying the synchrony between two event strings by performing inference in a probabilistic model", *Proc. IEICE Neuro-Computing Workshop,* Nara, Japan, Oct. 11, 2006.

J. Dauwels, "Computation of the capacity of continuous memoryless channels and the rate distortion function of continuous memoryless sources," *Proc. 2006 Hawaii, IEICE, and SITA Joint Conference on Information Theory,* Nara, Japan, May 23–26, 2006.

Book

J. Dauwels, *On Graphical Models for Communications and Machine Learning: Algorithms, Bounds, and Analog Implementation*, Series in Signal and Information Processing, vol. 17, Hartung-Gorre Verlag, May 2006, 492 pages, ISBN 3-86628-080-7.

Submitted Journal Papers

F. Vialatte, J. Dauwels, M. Maurice, and A. Cichocki, "Improving the specificity of EEG for diagnosing Alzheimer's disease," *International Journal of Alzheimer's Disease*, submitted (invited paper).

J. Dauwels, A. Eckford, S. Korl, H.-A. Loeliger, "Expectation Maximization as Message Passing-Part I: Principles and Gaussian Messages," submitted to *IEEE Transactions on Information Theory*.

Submitted Conference Papers

J. Dauwels, S. Cash, and E. Eskandar, "Automated localization of Seizure Onset Area from Intracranial Non-Seizure," submitted to *IEEE Int. Conf. on Acoustics and Signal Processing (ICASSP) 2010*.

Invited Talks and Seminars

Automatic Localization of the Seizure Focus from Interictal Intracranial EEG, RIKEN Brain Science Institute, January, 2010.

Signal Processing for Diagnosis and Treatment of Brain Disorders, University of Electro-Communications, Tokyo, Japan, January, 2010.

Signal Processing for Diagnosis and Treatment of Brain Disorders, Nanyang Technological University, Singapore, September 2009.

Signal Processing for Diagnosis and Treatment of Brain Disorders, Virginia Common Wealth University, Richmond, VA, October 2009.

Automatic Localization of the Seizure Focus from Interictal Intracranial EEG, MIT, Cambridge, MA, October, 2009.

Signal Processing for Diagnosis and Treatment of Brain Disorders, EPFL, Lausanne, Switzerland, September 2009.

Signal Processing for Diagnosis and Treatment of Brain Disorders, University of Biel, Switzerland, September 2009.

Signal Processing for Diagnosis and Treatment of Brain Disorders, Syracuse University, Syracuse, NY, June 2009.

Signal Processing for Diagnosis and Treatment of Brain Disorders, Minnesota University, Minneapolis, MN, May 2009.

Signal Processing for Diagnosis and Treatment of Brain Disorders, Imperial College, London, UK, March 2009.

Signal Processing for Diagnosis and Treatment of Brain Disorders, Massachusetts General Hospital, Boston, MA, February 2009.

Quantifying statistical interdependence of point processes with application to spike data and EEG, Kyoto University, Kyoto, Japan, November 2008.

Machine learning techniques for quantifying neural synchrony: application to the diagnosis of Alzheimer's disease from EEG, Max Planck Institute Frankfurt, Frankfurt, Germany, June 2008.

Machine learning techniques for quantifying neural synchrony: application to the diagnosis of Alzheimer's disease from EEG, ETH Zurich, Zurich, Switzerland, June 2008.

Machine learning techniques for quantifying neural synchrony: application to the diagnosis of Alzheimer's disease from EEG, Massachusetts General Hospital, Boston, MA, May 2008.

Stochastic event synchrony: a statistical tool for aligning multivariate multi-dimensional point processes, Tokyo Institute of Technology, Tokyo, Japan, March 2008.

Machine Learning Techniques for Quantifying Neural Synchrony: Application to the Early Diagnosis of Alzheimer's Disease from EEG, LIDS, MIT, Cambridge, MA, Feb. 2008.

Machine learning methods for exploring EEG dynamics, NAIST, Nara, Japan, Dec. 2007.

Human brain dynamics and synchrony measures, applications to detection of Alzheimer's disease, Symposium on Brain Activity and Information Integration, RIKEN, Wako-shi, Saitama, Japan, Sept. 13, 2007.

Channel estimation by passing messages in graphical models, Deepening and Expansion of Statistical Mechanical Informatics Workshop, The Institute of Statistical Mathematics, Tokyo, Japan, August 27–28, 2007.

Factor graph based signal processing, Nara Advanced Institute for Science and Technology (NAIST), Nara, Japan, Oct. 12, 2006.

Factor graph based inference: algorithms and bounds, Workshop on Machine Learning and Optimization, The Institute of Statistical Mathematics, Tokyo, Japan, August 16th, 2006.

Factor graph based inference: algorithms and bounds, Waseda University, Waseda, Japan, May 30, 2006.

On applications of information geometry to signal processing, digital communications, and related areas, the 5th Workshop on Differential Geometry and Information Geometry, Nagoya University, February 17-18, 2006.

Applications of message passing, MIT (LIDS/CSAIL/RLE), Cambridge, MA, December 12, 2005.

On information-geometric aspects of graphical models and kernels, NIPS Workshop, Whistler, Canada, December 10, 2005.

On Cramér-Rao-bound paradoxes (and how to circumvent them), University of Gent, Belgium, June 03, 2005.

Phase estimation by EM and steepest descent, University of Gent, Belgium, May 24, 2005.

Phase estimation by EM and steepest descent, University of Louvain-la-Neuve (UCL), Belgium, May 23, 2005.

Applications of graphical models in signal processing, RIKEN Brain Science Institute, Saitama, Japan, Jan. 6, 2005.

An analog circuit that locks onto a pseudo-noise signal, Kanazawa Institute of Technology, Kanazawa, Japan, Dec. 16, 2004.

Message Passing, Factor Graphs and Analog Circuits, School and Conference on Fundamental Aspects of Complexity, Abdus Salam International Center for Theoretical Physics, Trieste, Sept. 6–9, 2004.

An analog circuit that locks onto a pseudo-noise signal, Workshop on Statistical Aspects of Electronic Systems, Lavin, Switzerland, Oct. 28–30, 2004.

Towards Quantum Algorithms for Inference, Physics and Media Group , MediaLab, MIT, Cambridge, MA, May 18, 2004.

Turbo Signal Processing, University of Ghent, Sept. 11, 2003.

Loeliger's Universe, Physics and Media Group , MediaLab, MIT, Cambridge, MA, Dec. 4, 2003.

Workshops (most with poster presentation)

Fourth International Workshop Statistical Analysis of Neuronal Data (SAND4), May 29–31, 2008 Pittsburgh, PA.

Neuro 2007, Yokohama-shi, Kanagawa, Japan, Sept. 10–12, 2007.

Retreat of the Picower Institute for Learning and Memory (MIT), Cape Cod, MA, USA, May 30–June 1, 2007.

Joint Workshop of RIKEN BSI and Picower Institute for Learning and Memory, MIT, Cambridge, MA, USA, May 29, 2007.

Systems Neurobiology Spring School: Information Processing and Developments in Neural Systems, Osaka, Japan, March 9–11, 2007.

RIKEN Brain Science Institute Summer Program: Dynamical States in the Brain, Saitama, Japan, July 24–August 4, 2006.

Okinawa Computational Neuroscience Course, Okinawa, Japan, June 26–July 7, 2006.

Information Geometry from the Perspective of Affine Differential Geometry, RIKEN, BSI, January 29-30, 2006.

Machine Learning Summer School 2004, Pascal Network, Berder Island, France, Sept. 12–25, 2004.

Quantum Systems for Information Technology Workshop, Flums, Switzerland, March 5–7, 2004.

Avogadro-Scale Engineering: Form and Function, MIT, Cambridge, Nov. 18–19, 2003.

2nd Analog Decoding Workshop, Zürich, Switzerland, Sept. 8, 2003.

Probability and Statistical Mechanics in Information Science, Centro di Ricerca Matematica Ennio De Giorgi, Pisa, Italy, June 3–July 20, 2003.

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