

ICANN 2016 Scientific Program



**BarcelonaTech, Universitat Politècnica de Catalunya
Edifici Vèrtex**

September 6-9, 2016



Time	Tuesday 6-Sep-2016		Wednesday 7-Sep-2016		Time
08:00					08:00
08:20					08:20
08:40					08:40
09:00	Registration Information Desk Open (9:00 - 19:00)	Satellite Event Workshop on Machine Learning and Interpretability	Registration Information Desk Open (8:00 - 19:00) Posters on Display	Stephen Coombes (University of Nottingham, UK) - Modelling Brain Waves	09:00
09:20					09:20
09:40					09:40
10:00				Coffee Break (10:00 - 10:40)	10:00
10:20					10:20
10:40					10:40
11:00				Complex Networks	11:00
11:20				Deep Learning 2	11:20
11:40					11:40
12:00					12:00
12:20					12:20
12:40					12:40
13:00				Poster and Demonstrations Session 1 (12:40 - 14:40)	13:00
13:20					13:20
13:40					13:40
14:00		Opening ICANN		Lunch Break (13:40 - 14:40)	14:00
14:20		Erkki Oja (Aalto University, Helsinki, Finland) - Unsupervised learning for matrix decompositions			14:20
14:40					14:40
15:00				EEG/MEG Analysis	15:00
15:20		Brain Topology and Dynamics		Learning Foundations 1	15:20
15:40		Deep Learning 1			15:40
16:00					16:00
16:20					16:20
16:40				Coffee Break (16:40 - 17:20)	16:40
17:00					17:00
17:20		Coffee Break (17:20 - 18:00)		Joaquin Fuster (University of California Los Angeles, USA) - The Prefrontal Cortex is a predictive and preadaptive organ	17:20
17:40					17:40
18:00					18:00
18:20		Synaptic Plasticity		Recurrent Neural Networks	18:20
18:40		Ensemble Networks		Support Vector Machines	18:40
19:00					19:00
19:20		Günther Palm (University of Ulm, Germany) - What are the units of neural representations?			19:20
19:40					19:40
20:00				ENNS ExCom meeting	20:00
20:20					20:20
20:40					20:40
21:00		Welcome Reception (20:20 - 22:00)		ENNS 25th anniversary social gathering (20:40 - 22:00)	21:00
21:20					21:20
21:40					21:40
22:00					22:00

Time	Thursday 8-Sep-2016		Friday 9-Sep-2016		Time
08:00	Registration Information Desk Open (8:00 - 19:00)	Posters on Display	Information Desk Open (8:00 - 15:00)	Posters on Display	08:00
08:20					08:20
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10:40					10:40
11:00					11:00
11:20	Higher Nervous Activity 1	Clustering	Perception Action Dynamics	Forecasting	11:20
11:40					11:40
12:00					12:00
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14:40					14:40
15:00	Neuronal Hardware 1	Decision Making	Emerging patterns	Neuronal Hardware 2	15:00
15:20					15:20
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18:00					18:00
18:20					18:20
18:40					18:40
19:00	Social Programme Excursion Visit (18:00 - 20:00)	Gala Dinner (20:00 - 22:00)	Awards and Closing Ceremony	Satellite Event Workshop on Challenges in Living Neuronal Networks	19:00
19:20					19:20
19:40					19:40
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22:00					22:00

How to get to ICANN 2016

ICANN 2016 is located in at the Universitat Politècnica de Catalunya Campus Nord, Edifici Vèrtex.

Address: Plaça Eusebi Güell, 6, 08034 Barcelona, Spain.

From the airport

By metro Take the L9 Sud (orange line), destination Zona Universitària, and get off at the last stop. The trip takes a little over half an hour. From there it's a 10-15 minute walk to Edifici Vèrtex. The L9 line may be taken from both terminals of the airport.

By train A train leaves every 30 minutes from T2 terminal and should take about 20 minutes to reach Barcelona Sants. From there you may take the metro L3 (green line) with destination Zona Universitària, and get off at Palau Reial. This takes 15-20 minutes in total.

Tickets for both itineraries can be purchased at the vending machines in the stations. Transport by bus, although possible, is not recommended due to the amount of transfers and connections needed. For more information, see the metro (<http://www.tmb.cat/en/home>) and train (<http://rodalies.gencat.cat/en/horaris/index.html>) websites.



Map of the building Vèrte and location of the building areas of interest of ICANN 2016.

Internet Access

The Universitat Politècnica de Catalunya is a member of the **eduroam** (education roaming) network for a secure Wi-Fi access for educational institutions. Wi-Fi connection is available inside the building and throughout the campus.

Instructions for speakers and poster presenters

Oral presentations They will take place in the room specified for the assigned session. The speaker is responsible for being present with reasonable time in advance. The rooms are equipped with a projector with standard VGA interface (remember to bring an adapter if your laptop doesn't have a VGA port). The duration of talks is of 15 minutes plus 5 minutes of questions and discussions. Given the tight conference schedule, the total time of 20 minutes for each slot shall not be exceeded. The speakers and the session chairs cooperate to make the conference programme progress as planned.

Posters The posters are on display for the entire duration of the conference in rooms VS215, VS216, VS217. The poster presenters are responsible for hanging their poster at the assigned location and removing it at the end of the conference. Tape and pins will be provided. The presenters shall stand next to their poster during the assigned poster session: **Wednesday the 7th** for posters with an odd number, and **Friday the 9th** for posters with an even number (e.g. poster C1.04 should be presented during the poster session on Friday the 9th).

Tuesday, 6 September 2016**14:00-14:20 (Auditori) Opening address**

14:15-14:30 *Welcome address and opening of the conference.* ANTONIO J. PONS, ALESSANDRO E. P. VILLA, JORDI GARCIA-OJALVO.

14:25-15:20 (Auditori) Plenary Lecture 1 “ENNS John G. Taylor Lecture”

L1 *Erkki Oja (Aalto University, Helsinki, Finland) - Unsupervised learning for matrix decompositions*

Abstract: Unsupervised learning is a classical approach in pattern recognition and data analysis. Its importance is growing today, due to the increasing data volumes and the difficulty of obtaining statistically sufficient amounts of of labelled training data. Typical analysis techniques using unsupervised learning are principal component analysis, independent component analysis, and cluster analysis. They can all be presented as decompositions of the data matrix containing the unlabeled samples. Starting from the classical results, and especially the state-of-the-art during the first ICANN conference in 1991, the author reviews some advances in the field up to the present day.

Chair: Alessandro E. P. Villa

15:20-17:20 (Sala d'Actes) A1. Brain Topology and Dynamics

Chair: Jérémie Cabessa

A1.1 *Mapping the Language Connectome in Healthy Subjects and Brain Tumor Patients* GREGORY ZEGAREK, XERXES ARSIWALLA, DAVID DALMAZZO, PAUL VERSCHURE

A1.2 *Experimental Approaches to Assess Connectivity in Living Neuronal Networks* LLUÍS HERNÁNDEZ-NAVARRO, JAVIER G. ORLANDI, JAUME CASADEMUNT, JORDI SORIANO

A1.3 *Method for Estimating Neural Network Topology Based on SPIKE-distance* KAORI KURODA, MIKIO HASEGAWA

A1.4 *Dynamics of evolving feed-forward neural networks and their topological invariants* PAOLO MASULLI, ALESSANDRO E.P. VILLA

A1.5 *Scaling Properties of Human Brain Functional Networks* RICCARDO ZUCCA, XERXES ARSIWALLA, HOANG LE, MIKAIL RUBINOV, PAUL VERSCHURE

A1.6 *Attractor Dynamics Driven by Interactivity in Boolean Recurrent Neural Networks* JÉRÉMIE CABESSA, ALESSANDRO E.P. VILLA

15:20-17:20 (Auditori) B1. Deep Learning 1

Chair: Omid E. David

B1.1 *Video Description using Bidirectional Recurrent Neural Networks* ÁLVARO PERIS, MARC BOLAÑOS, PETIA RADEVA, FRANCISCO CASACUBERTA

B1.2 *Tactile Convolutional Networks for Online Slip and Rotation Detection* MARTIN MEIER, FLORIAN PATZELT, ROBERT HASCHKE, HELGE RITTER

B1.3 *DeepPainter: Painter Classification Using Deep Convolutional Autoencoders* OMID E. DAVID, NATHAN S. NETANYAHU

B1.4 *Revisiting Deep Convolutional Neural Networks for RGB-D based Object Recognition* LORAND MADAI-TAHY, SEBASTIAN OTTE, RICHARD HANTEN, ANDREAS ZELL

B1.5 *Deep Learning for Emotion Recognition in Faces* ARIEL RUIZ-GARCIA, MARK ELSHAW, ABDULRAHMAN AL-TAHHAN, VASILE PALADE

B1.6 *Extracting muscle synergy patterns from EMG data using autoencoders* MARTIN SPÜLER, NEREA IRASTORZALANDA, ANDREA SARASOLA-SANZ, ANDER RAMOS-MURGUIALDAY

17:20-18:00 Coffee break

18:00-19:20 (Sala d'Actes) A2. Synaptic Plasticity

Chair: Roseli Wedemann

A2.1 *Improved Chaotic Multidirectional Associative Memory* HIROKI SATO, YUKO OSANA

A2.2 *Effect of Pre- and Postsynaptic Firing Patterns on Synaptic Competition* NOBUHIRO HINAKAWA, KATSUNORI KITANO

A2.3 *Assymetries in Synaptic Connections and the Nonlinear Fokker-Planck Formalism* ROSELI WEDEMANN, ANGEL R. PLASTINO

A2.4 *Synaptogenesis: Constraining Synaptic Plasticity Based on Distance* JORDI-YSARD PUIGBÒ LLOBET, JOERI V. WIJNGAARDEN, SOCK CHING LOW, PAUL VERSCHURE

18:00-19:20 (Auditori) B2. Ensemble Networks

Chair: TBA

B2.1 *Ensemble Models of Learning Vector Quantization Based on Bootstrap Resampling* FUMIAKI SAITOH

B2.2 *Learning to Enumerate* PATRICK JÖRGER, YUKINO BABA, HISASHI KASHIMA

B2.3 *Classification of Photo and Sketch Images using Convolutional Neural Networks* KAZUMA SASAKI, MADOKA YAMAKAWA, KANA SEKIGUCHI, TETSUYA OGATA

B2.4 *Use of Ensemble Approach and Stacked Generalization for Neural Network Prediction of Geomagnetic Dst Index* VLADIMIR SHIROKY, IRINA MYAGKOVA, SERGEY DOLENKO

19:25-20:20 (Auditori) Plenary Lecture 2

L2 *Günther Palm (University of Ulm, Germany) - What are the units of neural representations?*

Abstract: This classical question in computational neuroscience may also be relevant for the design of artificial neural networks for technical applications. In the discussion of this question I will touch upon various related topics such as: Does a representation need units? Is it in terms of single neurons, neural population activity, or spatio-temporal patterns? What are the relevant populations? What about sparse representations?

Chair: Petia Koprinkova-Hristova

20:20-22:00 *Welcome reception*

Wednesday, 7 September 2016

09:05-10:00 (Auditori) Plenary Lecture 3

L3 *Stephen Coombes (University of Nottingham, UK) - Modelling Brain Waves*

Abstract: In this talk I will explore the way in which synaptically coupled neural networks may generate and maintain travelling waves of activity. Although these models are inherently non-local, a combination of mathematical approaches (predominantly drawn from non-smooth dynamical systems) means that we are now in a position to address fundamental questions about the effects of intrinsic ionic currents, synaptic processing, and anatomical connectivity on travelling waves in neural tissue. I will present a number of examples from both one and two dimensions, focusing on the contributions of axonal delays, adaptation, refractoriness, and slow hyper-polarisation activated currents, to brain waves seen in the cortex, thalamus, and hippocampus. I will also endeavour to explain the functional relevance of such waves and how in some instances they may subserve natural computation.

Chair: Antonio J. Pons

10:00-10:40 Coffee break

10:40-12:40 (Sala d'Actes) A3. Complex Networks

Chair: Peter Erdi

A3.1 *Centering versus Scaling for Hubness Reduction* ROMAN FELDBAUER, ARTHUR FLEXER

A3.2 *State-dependent information processing in gene regulatory networks* MARÇAL GABALDÀ SAGARRA, JORDI GARCIA-OJALVO

A3.3 *High Integrated Information in Complex Networks Near Criticality* XERXES ARSIWALLA, PAUL VERSCHURE

A3.4 *Patent Citation Network Analysis: Topology and evolution of patent citation networks* PETER ERDI

A3.5 *Patent Citation Network Analysis: Ranking: from web pages to patents* PETER ERDI, PÉTER BRUCK

A3.6 *Comparison of graph node distances on clustering tasks* FELIX SOMMER, FRANÇOIS FOUSS, MARCO SAERENS

10:40-12:40 (Auditori) B3. Deep Learning 2

Chair: Bryan Tripp

B3.1 *Integration of Unsupervised and Supervised Criteria for Deep Neural Networks Training* FRANCISCO ZAMORA-MARTINEZ, FRANCISCO JAVIER MUÑOZ-ALMARAZ, JUAN PARDO

B3.2 *Layer-wise Relevance Propagation for Neural Networks with Local Renormalization Layers* ALEXANDER BINDER, GRÉGOIRE MONTAVON, SEBASTIAN LAPUSCHKIN, KLAUS-ROBERT MÜLLER, WOJCIECH SAMEK

B3.3 *Analysis of dropout learning regarded as ensemble learning* KAZUYUKI HARA, DAISHUKE SAITOH, HAYARU SHOUNO

B3.4 *The Effects of Regularization on Learning Facial Expressions with Convolutional Neural Networks* TOBIAS HINZ, PABLO BARROS, STEFAN WERMTER

B3.5 *DeepChess: End-to-End Deep Neural Network for Automatic Learning in Chess* OMID E. DAVID, NATHAN S. NETANYAHU, LIOR WOLF

B3.6 *A convolutional network model of the primate middle temporal area* BRYAN TRIPP

12:40-14:40 (Rooms VS215, VS216, VS217) Posters and Demonstrations - Session 1

All posters remain on display.

13:40-14:40 Lunch break

14:40-16:40 (Sala d'Actes) A4. EEG/MEG Analysis*Chair: Marta Castellano***A4.1** *Applicability of Echo State Networks to classify EEG data from a movement task* LUKAS HESTERMEYER, GORDON PIPA**A4.2** *Data assimilation of EEG observations by neural mass models* LARA ESCUAIN-POOLE, JORDI GARCIA-OJALVO, ANTONIO J. PONS**A4.3** *Identification of epileptogenic rhythms in a mesoscopic neuronal model* MACIEJ JEDYNAK, JORDI GARCIA-OJALVO, ANTONIO JAVIER PONS RIVERO, MARC GOODFELLOW**A4.4** *EEG-driven RNN classification for prognosis of neurodegeneration in at-risk patients* GIULIO RUFFINI, DAVID IBAÑEZ-SORIA, MARTA CASTELLANO, STEPHEN DUNNE, AURELI SORIA-FRISCH**A4.5** *Functional reorganization of neural networks prior to epileptic seizures* ADRIÀ TAUSTE CAMPO, ALESSANDRO PRINCIPE, RODRIGO ROCAMORA, GUSTAVO DECO**A4.6** *Competition between neural ensembles explains pitch-related dynamics of the auditory evoked field* ALEJANDRO TABAS, ANDRÉ RUPP, EMILI BALAGUER-BALLESTER**14:40-16:40 (Auditori) B4. Learning Foundations 1***Chair: TBA***B4.1** *Combining spatial and parametric working memory in a dynamic neural field model* WERONIKA WOJTAK, STEPHEN COOMBES, ESTELA BICHO, WOLFRAM ERLHAGEN**B4.2** *C4.5 or Naive Bayes: A Discriminative Model Selection Approach* LUNGAN ZHANG, LIANGXIAO JIANG, CHAOQUN LI**B4.3** *Adaptive Natural Gradient Learning Algorithms for Unnormalized Statistical Models* RYO KARAKIDA, MASATO OKADA, SHUN-ICHI AMARI**B4.4** *Learning Method for a Quantum Bit Network* YOSHIHIRO OSAKABE, SHIGEO SATO, MITSUNAGA KINJO, KOJI NAKAJIMA, HISANAO AKIMA, MASAO SAKURABA**B4.5** *Information-theoretical foundations of Hebbian learning* CLAUDIUS GROS, RODRIGO ECHEVESTE**B4.6** *On higher order computations and synaptic meta-plasticity in the human brain* STANISLAW AMBROSZKIEWICZ*16:40-17:20 Coffee break***17:25-18:20 (Auditori) Plenary Lecture 4****L4** *Joaquin Fuster (University of California Los Angeles, USA) - The Prefrontal Cortex is a predictive and preadaptive organ*

Abstract: Purposeful and goal-directed behavior or language is guided by the neural mechanisms of the perception-action cycle (PA cycle), the circular cybernetic exchange of information between the brain and the environment. The PA cycle flows through the cerebral cortex, the environment, and back to the cortex. The prefrontal cortex controls the temporal organization of the PA cycle through its prospective functions of attention, working memory, and decision-making. These functions regulate activity in other cortical regions toward the attainment of adaptive and rewarding goals.

*Chairs: Maria V. Sanchez-Vives, Alessandro E. P. Villa***18:20-20:00 (Sala d'Actes) A5. Recurrent Neural Networks***Chair: TBA***A5.1** *Spectral Analysis of Echo State Networks* PAU VILIMELIS ACEITUNO, YAN GANG**A5.2** *Training Bidirectional Recurrent Neural Network architectures with the Scaled Conjugate Gradient algorithm* MICHALIS AGATHOCLEOUS, CHRIS CHRISTODOULOU, VASILIS PROMPONAS, PETROS KOUNTOURIS, VASSILIS VASSILI-ADES

A5.3 *Learning Multiple Timescales in Recurrent Neural Networks* TAYFUN ALPAY, STEFAN HEINRICH, STEFAN WERMTER

A5.4 *Investigating Recurrent Neural Networks for Feature-less Computational Drug Design* ALEXANDER DÖRR, SEBASTIAN OTTE, ANDREAS ZELL

A5.5 *Inverse Recurrent Models - An Application Scenario for Many-Joint Robot Arm Control* SEBASTIAN OTTE, ADRIAN ZWIENER, RICHARD HANTEN, ANDREAS ZELL

18:20-19:40 (Auditori) B5. Support Vector Machines

Chair: TBA

B5.1 *Kernel Depth Measures for Functional Data with application to Outlier Detection* NICOLÁS HERNÁNDEZ, ALBERTO MUÑOZ

B5.2 *Nesterov Acceleration for the SMO Algorithm* ALBERTO TORRES-BARRÁN, JOSE DORRONSORO

B5.3 *Local reject option for deterministic multi-class SVM* JOHANNES KUMMERT, BENJAMIN PAASSEN, JORIS JENSEN, CHRISTINA GÖPFERT, BARBARA HAMMER

B5.4 *Palmprint biometric system modeling by DBC and DLA methods and classifying by KNN and SVM classifiers* MOKNI RAOUIA, MONJI KHERALLAH

20:00-20:40 ENNS Executive Committee Meeting

20:40-22:00 ENNS 25th Anniversary Social Gathering

Thursday, 8 September 2016

09:05-10:00 (Auditori) Plenary Lecture 5

L5 *Věra Kůrková (Academy of Sciences of the Czech Republic) - Limitations of Shallow Neural Networks*

Abstract: Recent successes of deep networks pose a theoretical question: When are deep nets provably better than shallow ones? We show that for most common types of computational units, almost any uniformly randomly chosen function on a sufficiently large domain cannot be computed by a reasonably sparse shallow network. Our theoretical arguments, based on the probabilistic and geometric properties of high-dimensional spaces, are complemented by the concrete construction of classes of such functions. We describe an example of functions which cannot be computed by shallow networks with number of units depending on input dimension polynomially but can be computed by two-hidden-layer networks with number of units depending on the dimension linearly. We also discuss connections with the No Free Lunch Theorem, with the central paradox of coding theory, and with pseudo-noise sequences.

Chair: Antonio J. Pons

10:00-10:40 Coffee break

10:40-12:40 (Sala d'Actes) A6. Higher Nervous Activity 1

Chair: Maria V. Sanchez-Vives

A6.1 *Multistable attractor dynamics in columnar cortical networks transitioning from deep anesthesia to wakefulness.* CRISTIANO CAPONE, NÚRIA TORT-COLET, MARIA V. SANCHEZ-VIVES, MAURIZIO MATTIA

A6.2 *Influence of Saliency and Social Impairments on the Development of Intention Recognition* LAURA COHEN, AUDE BILLARD

A6.3 *A System-level Model of Noradrenergic function* MAXIME CARRERE, FREDERIC ALEXANDRE

A6.4 *Modulation of cortical intrinsic bistability and complexity in the cortical network* MARIA V. SANCHEZ-VIVES, JULIA F. WEINERT, BEATRIZ REBOLLO, ADENAUER CASALI, ANDREA PIGORINI, MARCELLO MASSIMINI, MATTIA D'ANDOLA

A6.5 *Phenomenological model for the adaptation of shape-selective neurons in area IT* MARTIN GIESE, PRADEEP KURAVI, RUFIN VOGELS

A6.6 *Deliberation-aware Responder in Multi-Proposer Ultimatum Game* MARKO RUMAN, FRANTISEK HULA, MIROSLAV KARNY, TATIANA V. GUY

10:40-12:40 (Auditori) B6. Clustering

Chair: Yoichi Hayashi

B6.1 *Bi-Modal Deep Boltzmann Machine Based Musical Emotion Classification* MOYUAN HUANG, WENGE RONG, TOM ARJANNIKOV, NAN JIANG, ZHANG XIONG

B6.2 *Accuracies and Number of Rules Extracted Using the Re-RX Algorithm Family from a Pareto-Optimal Perspective* YOICHI HAYASHI, GUIDO BOLOGNA, RIKU HASHIGUCHI

B6.3 *StreamLeader: a new stream clustering algorithm not based in conventional clustering* JAIME ANDRES-MERINO, LLUIS BELANCHE

B6.4 *Comparison of Methods for Community Detection in Networks* HASSAN MAHMOUD, FRANCESCO MASULLI, STEFANO ROVETTA, AMR ABDULLATIF

B6.5 *A Robust Evolutionary Optimisation Approach for Parameterising a Neural Mass Model* ELHAM ZAREIAN, JUN CHEN, BASABDATTA SEN BHATTACHARYA

B6.6 *Finding an hidden common partition in duplex structure-function brain networks* CASIMIRO PIO CARRINO, SEBASTIANO STRAMAGLIA

12:40-13:40 (Auditori) ENNS General Assembly**13:40-14:40 (Rooms VS215, VS216, VS217) Posters on display**

All posters remain on display.

13:40-14:40 Lunch break

14:40-16:00 (Sala d'Actes) A7. Neuronal Hardware 1

Chair: Juan Manuel Moreno Arostegui

A7.1 Real-Time FPGA Simulation of Surrogate Models of Large Spiking Networks MURPHY BERZISH, CHRIS ELIASMITH, BRYAN TRIPP

A7.2 Randomly spiking dynamic neural fields driven by a shared random flow BENOÎT CHAPPET DE VANGEL, BENARD GIRAU

A7.3 Synfire Chain Emulation by Means of Flexible SNN Modeling on a SIMD Multicore Architecture MIREYA ZAPATA, JORDI MADRENAS

A7.4 Towards adjustable signal generation with photonic reservoir computers PIOTR ANTONIK, MICHIEL HERMANS, MARC HAELTERMAN, SERGE MASSAR

14:40-16:00 (Auditori) B7. Decision Making

Chair: Miroslav Karny

B7.1 Attractor models of perceptual decisions making exhibit stochastic resonance GENIS PRAT-ORTEGA, KLAUS WIMMER, ALEX ROXIN, JAIME DE LA ROCHA

B7.2 Dynamics of reward based decision making : a computational study BHARGAV TEJA NALLAPU, NICOLAS ROUGIER

B7.3 Adaptive Proposer for Ultimatum Game FRANTIŠEK HŮLA, MARKO RUMAN, MIROSLAV KARNY

B7.4 Dynamical Linking of Positive and Negative Sentences to Goal-oriented Robot Behavior by Hierarchical RNN TATSURO YAMADA, SHINGO MURATA, HIROAKI ARIE, TETSUYA OGATA

16:05-17:00 (Auditori) Plenary Lecture 6

L6 Murray Shanahan (Imperial College London, UK) - Metastability in neural dynamics

Abstract: Sets of oscillators in a modular network can exhibit a rich variety of metastable states in which synchronisation and desynchronisation coexist. Systems of oscillators tuned to behave this way have been shown to reproduce the statistics of brain activity under various conditions, including resting state, cognitive control, and sleep. In this talk I will describe this strange dynamical regime and how it can be modeled, and describe some of its applications in neuroscience.

Chair: Jordi Garcia-Ojalvo

17:00-20:00 Social programme - Excursion

20:00-22:00 Gala Dinner

Friday, 9 September 2016

09:05-10:00 (Auditori) Plenary Lecture 7

L7 Etienne Koechlin (Pierre and Marie Curie University, France) - Adaptive behavior and human reasoning

Abstract: I will present our recent works combining computational modeling, experimental psychology and fMRI describing how the prefrontal cortex subserves reasoning in the service of decision-making and adaptive behavior. I will show how the ventromedial, dorsomedial, lateral and polar prefrontal regions along with the striatum forms an unified system combining inferential and creative abilities for efficient behavior in uncertain, variable and open-ended environments.

Chair: Antonio J. Pons

10:00-10:40 Coffee break

10:40-12:40 (Sala d'Actes) A8. Perception Action Dynamics

Chair: TBA

A8.1 Adaptive Hierarchical Sensing HENRY SCHÜTZE, ERHARDT BARTH, THOMAS MARTINETZ

A8.2 Across-trial dynamics of stimulus priors in an auditory discrimination task AINHOA HERMOSO MENDIZABAL, ALEXANDRE HYAFIL, PAVEL ERNESTO RUEDA OROZCO, SANTIAGO JARAMILLO, DAVID ROBBE, JAIME DE LA ROCHA

A8.3 Realization of Profit Sharing by Self-Organizing Map-based Probabilistic Associative Memory TAKAHIRO KATAYAMA, YUKO OSANA

A8.4 Body Model Transition by Tool Grasping During Motor Babbling using Deep Learning and RNN KUNINUYUKI TAKAHASHI, HADI TJANDRA, TETSUYA OGATA, SHIGEKI SUGANO

A8.5 Artificial Neural Network-Based Control Architecture: A Simultaneous Top-down and Bottom-up Approach to Autonomous Robot Navigation DALIA MARCELA ROJAS CASTRO, ARNAUD REVEL, MICHEL MÉNARD

A8.6 A Novel quasi-Newton-based Training using Nesterov's Accelerated Gradient for Neural Networks HIROSHI NINOMIYA

10:40-12:40 (Auditori) B8. Forecasting

Chair: Irena Koprinska

B8.1 Day-ahead PV power forecast by hybrid ANN compared to the five parameters model estimated by particle filter algorithm EMANUELE OGLIARI, MARCO MUSSETTA, ALBERTO BOLZONI, SONIA LEVA

B8.2 Extended Weighted Nearest Neighbor for Electricity Load Forecasting MASHUD RANA, IRENA KOPRINSKA, ALICIA TRONCOSO, VASSILIOS AGELIDIS

B8.3 Using Reservoir Computing and Trend Information for Short-Term Streamflow Forecasting SABRINA BEZERRA, CAMILA ANDRADE, MÊUSER VALENÇA

B8.4 Effect of Simultaneous Time Series Prediction with Various Horizons on Prediction Quality at the Example of Electron Flux in the Outer Radiation Belt of the Earth IRINA MYAGKOVA, VLADIMIR SHIROKY, SERGEY DOLENKO

B8.5 A Time Series Forecasting model based on Deep Learning Integrated Algorithm with Stacked Autoencoders and SVR for FX Prediction HUA SHEN, XUN LIANG

B8.6 Multivariate Dynamic Kernels for Financial Time Series Forecasting MAURICIO PENA, ARGIMIRO ARRATIA, LLUIS BELANCHE

12:40-14:40 (Rooms VS215, VS216, VS217) Posters and Demonstrations - Session 2

All posters remain on display.

13:40-14:40 Lunch break

14:40-16:00 (Sala d'Actes) A9. Emerging patterns*Chair: Jordi Soriano***A9.1** *Living Neuronal Networks in a Dish: Network Science and Neurological Disorders* SARA TELLER, ELISENDA TIBAU, JORDI SORIANO**A9.2** *A Potential Mechanism for Spontaneous Oscillatory Activity in the Degenerative Mouse Retina* KANAKO TANIGUCHI, CHIEKO KOIKE, KATSUNORI KITANO**A9.3** *Striatal Processing of Cortical Neuronal Avalanches – a Computational Investigation* JOVANA BELIC, JEANETTE HELLGREN KOTALESKI**A9.4** *Does the default network represent the 'model' in model-based decision-making?* RAPHAEL KAPLAN, GUSTAVO DECO**14:40-16:00 (Auditori) B9. Neuronal Hardware 2***Chair: Jim Harkin***B9.1** *Hierarchical Networks-on-Chip Interconnect for Astrocyte-Neuron Network Hardware* JUNXIU LIU, JIM HARKIN, LIAM McDAID, GEORGE MARTIN**B9.2** *VLSI design of a neural network model for detecting planar surface from local image motion* HISANAO AKIMA, SATOSHI MORIYA, SUSUMU KAWAKAMI, MASAFUMI YANO, KOJI NAKAJIMA, MASAO SAKURABA, SHIGEO SATO**B9.3** *Restricted Boltzmann Machines without Random Number Generators for Efficient Digital Hardware Implementation* SANSEI HORI, TAKASHI MORIE, HAKARU TAMUKOH**B9.4** *Compact Associative Memory for AER Spike Decoding in FPGA-Based Evolvable SNN Emulation* MIREYA ZAPATA, JORDI MADRENAS**16:05-17:00 (Auditori) Plenary Lecture 8****L7** *Wlodek Duch (Nicolaus Copernicus University, Torun, Poland) - Neurodynamics, Neuroimaging and Brains*

Abstract: Despite the astronomical complexity of the brain the engineering approach – understanding the brain by creating artificial brains – is feasible. To understand how brains work we need to describe animal and human phenotypes at all levels: genetic, proteins, cellular, neural, circuits, large network subsystems, and behavioral. This is the basis of precision medicine, NIMH Research Domain Criteria, but also a necessary step in understanding animal and human behavior. All mental states result from neural dynamics of the brain. Understanding mental processes in a conceptual way, without understanding their underlying neurodynamics, will always be limited. Brain mechanisms behind perception, cognitive activity, representation of concepts in the brain, have recently been discovered using functional neuroimaging techniques. Computational cognitive neurodynamics is leading the way to show how brain activity is linked to behavior. Examples are presented of computational models that provide insights into autism spectrum disorders, ADHD, distortions of memory states and formation of memes, development of conspiracy theories, dyscalculia, and learning styles. Hypothesis derived from these computational models are tested by experiments carried out in our recently created Neurocognitive Laboratory on infants, preschool children, students and old people.

*Chair: Věra Kůrková**17:00-17:50 Awards ceremony and closing remarks*

Poster Sessions C1-C7 (Rooms: VS215, VS216, VS217)

All posters remain on display during the entire duration of the conference in the rooms VS215, VS216, VS217 with a mandatory presenter standing next to their posters for **odd numbers on Wednesday the 7th** and for **even numbers on Friday the 9th**.

(C1) Spiking neurons and neurophysiology

C1.01 *Spiking neuron model of a key circuit linking visual and motor representations of actions.* MOHAMMAD HOVAIDI ARDESTANI, MARTIN GIESE

C1.02 *Analysis of the Effects of Periodic Forcing in the Spike Rate and Spike Correlation's in Semiconductor Lasers with Optical Feedback..* CARLOS QUINTERO-QUIROZ, TACIANO SORRENTINO, M. C. TORRENT, CRISTINA MASOLLER

C1.03 *Neuronal functional interactions inferred from analyzing multivariate spike trains generated by simple models simulations using frequency domain analyses available at open platforms.* TAKESHI ABE, YOSHIYUKI ASAI, ALESSANDRO E.P. VILLA

C1.04 *Controlling a Redundant Articulated Robot in Task Space with Spiking Neurons.* SAMIR MENON, VINAY SRIRAM, LUIS KUMANDURI, OUSSAMA KHATIB, KWABENA BOAHEN

C1.05 *A sensor fusion horse gait classification by a spiking neural network on SpiNNaker.* ANTONIO RIOS-NAVARRO, JUAN PEDRO DOMINGUEZ-MORALES, RICARDO TAPIADOR-MORALES, MANUEL J. DOMÍNGUEZ-MORALES, ANGEL JIMENEZ-FERNANDEZ, ALEJANDRO LINARES-BARRANCO

C1.06 *Multilayer spiking neural network for audio samples classification using SpiNNaker.* JUAN PEDRO DOMINGUEZ-MORALES, ANGEL JIMENEZ-FERNANDEZ, ANTONIO RIOS-NAVARRO, ELENA CEREZUELA-ESCUADERO, DANIEL GUTIERREZ, MANUEL J. DOMÍNGUEZ-MORALES, GABRIEL JIMENEZ-MORENO

C1.07 *Onset of global synchrony by application of a size-dependent feedback.* AUGUST ROMEO

C1.08 -. -

C1.09 *Modulation of Wave Propagation in the Cortical Network by Electrical Field.* POL BOADA-COLLADO, JULIA F. WEINERT, MAURIZIO MATTIA, MARIA V. SANCHEZ-VIVES

C1.10 *Investigation of SSEP by means of a Realistic Computational Model of the Sensory Cortex.* ELŻBIETA GAJEWSKA-DENDEK, PIOTR SUFFCZYŃSKI

C1.11 *Exploration of a mechanism to form bionic, self-growing and self-organizing neural network.* HAILIN MA, NING DENG, ZHIHENG XU, YUZHE WANG, YINGJIE SHANG, XU YANG, HU HE

C1.12 *Input-modulation as an alternative to conventional learning strategies.* ESIN YAVUZ, THOMAS NOWOTNY

(C2) Higher Nervous Activity 2

C2.01 *From Cognitive to Habit Behavior during Navigation, through Cortical-Basal Ganglia Loops.* JEAN-PAUL BANQUET, SOUHEIL HANOUNE, PHILIPPE GAUSSIER, MATHIAS QUOY

C2.02 *A neural network for visual working memory that accounts for memory binding errors.* JOAO BARBOSA, ALBERT COMPTE

C2.03 *Fast and Slow Learning in a Neuro-computational Model of Category Acquisition.* FRANCESC VILLAGRASA, JAVIER BALADRON, FRED H. HAMKER

C2.04 *Realizing Medium Spiny Neurons with a Simple Neuron Model.* SAMI UTKU ÇELIKOK

C2.05 *Single-neuron sensory coding might influence performance in a monkey's perceptual discrimination task.* PAU DE JORGE, VERÓNICA NÁCHER, ROGELIO LUNA, JORDI SORIANO, RANULFO ROMO, GUSTAVO DECO, ADRIÀ TAUSTE CAMPO

C2.06 *Modelling history-dependent perceptual biases in rodents.* ALEXANDRE HYAFIL, AINHOA HERMOSO MENDIZABAL, JAIME DE LA ROCHA

C2.07 *Multi-item Working Memory Capacity: What is the Role of the Stimulation Protocol?.* MARTA BALAGUÉ, LAURA DEMPÈRE-MARCO

C2.08 *Plasticity in the granular layer enhances motor learning in a computational model of the cerebellum.* GIOVANNI MAFFEI, IVAN HERREROS, MARTI SANCHEZ-FIBLA, PAUL VERSCHURE

C2.09 *How is scene recognition in a convolutional network related to that in the human visual system?.* SUGANDHA SHARMA, BRYAN TRIPP

C2.10 *Hybrid Trajectory Decoding from ECoG Signals for Asynchronous BCIs.* MARIE-CAROLINE SCHAEFFER, TETIANA AKSENOVA

(C3) Vision

C3.01 *Neural network with local receptive fields for illumination effects..* ALEJANDRO LERER, MATTHIAS KEIL, HANS SUPER

C3.02 *A Neural Network Model for Solving the Feature Correspondence Problem.* ALA ABOUDIB, VINCENT GRIPON, GILLES COPPIN

C3.03 *The Performance of a Biologically Plausible Model of Visual Attention to Localize Objects in a Virtual Reality.* AMIRHOSSEIN JAMALIAN, FREDERIK BEUTH, FRED H. HAMKER

C3.04 *Pose-invariant object recognition for event-based vision with slow-ELM.* ROHAN GHOSH, SIYI TANG, MAHDI RASOULI, NITISH THAKOR, SUNIL KUKREJA

C3.05 *Learning V4 curvature cell populations from sparse endstopped cells.* ANTONIO RODRIGUEZ-SANCHEZ, SABINE OBERLEITER, JUSTUS PIATER, HANCHEN XIONG

C3.06 *Recognition of Transitive Actions with Hierarchical Neural Network Learning.* LUIZA MICI, GERMAN IGNACIO PARISI, STEFAN WERMTER

C3.07 *Rotation-Invariant Restricted Boltzmann Machine using shared gradient filters.* MARIO VALERIO GIUFFRIDA, SOTIRIOS TSAFTARIS

(C4) Learning Foundations 2

C4.01 *Reducing Redundancy with Unit Merging for Self-constructive Normalized Gaussian Networks.* JANA BACKHUS, ICHIGAKU TAKIGAWA, HIDEYUKI IMAI, MINEICHI KUDO, MASANORI SUGIMOTO

C4.02 -. -

C4.03 *Pattern Based on Temporal Inference.* ZEINEB NEJI, MARIEME ELLOUZE, LAMIA HADRICH BELGUTH

C4.04 *Artificial Neural Network Models for Forecasting Tourist Arrivals to Barcelona.* BULENT ALPTEKIN, CAGDAS HAKAN ALADAG

C4.05 *Neural Networks Simulation of Distributed Control Problems with State and Control Constraints.* TIBOR KMET

C4.06 *The existence and the stability of weighted pseudo almost periodic solution of high-order Hopfield neural network.* CHAOUKI AOUITI, MOHAMMED SALAH M'HAMDI, FAROUK CHÉRIF

C4.07 *Experimental Study of Multistability and Attractor Dynamics in Winnerless Neural Networks.* ASHOK CHAUHAN, ALAIN NOGARET

C4.08 *Sparse Extreme Learning Machine Classifier Using Empirical Feature Mapping.* TAKUYA KITAMURA

C4.09 *Three approaches to training of Echo State Network Actors within Adaptive Critic Design.* PETIA KOPRINKOVA-HRISTOVA

C4.10 *Increase of the Resistance to Noise in Data for Neural Network Solution of the Inverse Problem of Magnetotellurics with Group Determination of Parameters.* IGOR ISAEV, EUGENY OBORENEV, IVAN OBORENEV, MIKHAIL SHIMELEVICH, SERGEY DOLENKO

C4.11 *Convergence of Multi-Pass Large Margin Nearest Neighbor Metric Learning.* CHRISTINA GÖPFERT, BENJAMIN PAASSEN, BARBARA HAMMER

(C5) Deep Learning 3

C5.01 *Pseudo Boosted Deep Belief Network.* TIEHANG DUAN, SARGUR N. SRIHARI

C5.02 *Keyword spotting with Convolutional Deep Belief Networks and Dynamic Time Warping.* BAPTISTE WICHT, ANDREAS FISCHER, JEAN HENNEBERT

C5.03 *Computational advantages of deep prototype-based learning.* THOMAS HECHT, ALEXANDER GEPPERTH

C5.04 *Orthogonal Permutation Linear Unit Activation Functions (OPLU).* ARTEM CHERNODUB, DIMITRI NOWICKI

C5.05 *Smartphone Based Human Activity and Postural Transition Classification with Deep Stacked Autoencoder Networks.* LUKE HICKS, VASILE PALADE, ABDULRAHMAN ALTAHHAN, YIH-LING HEDLEY, MARK ELSHAW

C5.06 *Deep Convolutional Neural Networks for Classifying Body Constitution.* HAI TENG LI, BIN XU, NANYUE WANG, JIA LIU

C5.07 *Feature Extractor based Deep Method to Enhance Online Arabic Handwritten Recognition System .* MOHAMED ELLEUCH, RAMZI ZOUARI, MONJI KHERALLAH

C5.08 *Cluster Ensembles Optimization Using Coral Reefs Optimization Algorithm.* ANNE CANUTO

C5.09 *Compression of Deep Neural Networks on the Fly.* GUILLAUME SOULIÉ, VINCENT GRIPON, MAËLYS ROBERT

C5.10 *Blind Super-Resolution with Deep Convolutional Neural Networks.* CLÉMENT PEYRARD, MOEZ BACCOUCHE, CHRISTOPHE GARCIA

C5.11 *DNN-Buddies: A Deep Neural Network-Based Estimation Metric for the Jigsaw Puzzle Problem.* DROR SHOLOMON, OMID E. DAVID, NATHAN S. NETANYAHU

C5.12 *A Deep Learning Approach for Hand Posture Recognition From Depth Data.* THOMAS KOPINSKI, FABIAN SACHARA, UWE HANDMANN, ALEXANDER GEPPERTH

C5.13 *Action Recognition in Surveillance Video Using ConvNets and Motion History Image.* SHENG LUO, HAOJIN YANG, CHENG WANG, XIAOYIN CHE, CHRISTOPH MEINEL

(C6) Identification and recognition

C6.01 *Artificial neural network for the urinary lithiasis type identification.* YASMINA NOZHA MEKKI, NADIR FARAH, ABDELATIF BOUTEFNOUCHET, KHEIR EDDINE CHETTIBI

C6.02 *Symbolic Association using Parallel Multilayer Perceptron.* FEDERICO RAUE, SEBASTIAN PALACIO, THOMAS BREUEL, WONMIN BYEON, ANDREAS DENGEL, MARCUS LIWICKI

C6.03 *Solution of an Inverse Problem in Raman Spectroscopy of Multi-component Solutions of Inorganic Salts by Artificial Neural Networks.* ALEXANDER EFITOROV, TATIANA DOLENKO, SERGEY BURIKOV, KIRILL LAPINSKIY, SERGEY DOLENKO

C6.04 *Sound Recognition System using Spiking and MLP Neural Networks.* ELENA CEREZUELA-ESCUADERO, ANGEL JIMENEZ-FERNANDEZ, RAFAEL PAZ-VICENTE, JUAN PEDRO DOMINGUEZ-MORALES, MANUEL J. DOMÍNGUEZ-MORALES, ALEJANDRO LINARES-BARRANCO

C6.05 *Using Machine Learning Techniques to Recover Prismatic Cirrus Ice Crystal Size from 2-Dimensional Light Scattering Patterns.* DANIEL PRIORI, GISELI DE SOUSA, MAURO ROISENBERG, CHRISTOPHER STOPFORD, EVELYN HESSE, EMMANUEL SALAWU, NEIL DAVEY, YI SUN

C6.06 *Artificial Neural Network-Based Modeling for Multi-scroll Chaotic Systems.* MOHAMMED AMIN KHELIFA, ABDELKRIM BOUKABOU

C6.07 *25 years of CNNs: Can we compare to human abstraction capabilities?.* SEBASTIAN STABINGER, ANTONIO RODRIGUEZ-SANCHEZ, JUSTUS PIATER

C6.08 *Detailed Remote Sensing of High Resolution Planetary Images by Artificial Neural Network.* MARZIEH FOROUTAN

C6.09 *A Combination Method for Reducing Dimensionality in Large Datasets.* DANIEL ARAÚJO, JHOSEPH JESUS, ADRIÃO DÓRIA NETO, ALLAN MARTINS

- C6.10** *Sentiment Analysis Using Extreme Learning Machine with Linear Kernel.* SHANGDI SUN, XIAODONG GU
- C6.11** *Two-class with oversampling versus one-class classification for microarray datasets.* BEATRIZ PÉREZ SÁNCHEZ, OSCAR FONTENLA-ROMERO, NOELIA SÁNCHEZ-MAROÑO
- C6.12** *Polar Sine-based Siamese Neural Network for Gesture Recognition.* SAMUEL BERLEMONT, GRÉGOIRE LEFEBVRE, STEFAN DUFFNER, CHRISTOPHE GARCIA
- C6.13** *Day Types Identification of Algerian Electricity Load Using an Image Based Two-Stage Approach.* KHEIR EDDINE FARFAR, MOHAMED TAREK KHADIR
- C6.14** *SMS Spam Filtering using Probabilistic Topic Modelling and Stacked Denoising Autoencoder.* NOURA AL MOUBAYED, TOBY BRECKON, PETER MATTHEWS, STEPHEN MCGOUGH
- C6.15** *Improving MDLSTM for Handwritten Arabic Word Recognition using Dropout at different positions.* RANIA MAALEJ, MONJI KHERALLAH

(C7) Navigation

- C7.01** *Improving Robustness of Slow Feature Analysis Based Localization Using Loop Closure Events.* BENJAMIN METKA, MATHIAS FRANZIUS, UTE BAUER-WERSING
- C7.02** *ROS based Autonomous Control of a Humanoid Robot.* VAIBHAV GANDHI, GANESH KUMAR KALYANI, ZHIJUN YANG, TAO GENG
- C7.03** *Self-Organizing Map for the Curvature-Constrained Traveling Salesman Problem.* JAN FAIGL, PETR VÁŇA
- C7.04** *A Robotic Implementation of Drosophila Larvae Chemotaxis.* DANIEL MALAGARRIGA, IVICA SLAVKOV, JAMES SHARPE, MATTHIEU LOUIS
- C7.05** *Non-Negative Kernel Sparse Coding for the Analysis of Motion Data.* BABAK HOSSEINI, FELIX HÜLSMANN, MARIO BOTSCH, BARBARA HAMMER
- C7.06** *Effect of Neural Controller on Adaptive Cruise Control.* ARDEN KUYUMCU, NESLIHAN SERAP SENGOR
- C7.07** *Intelligent Speech-Based Interactive Communication Between Mobile Cranes and Their Human Operators.* MACIEJ MAJEWSKI, WOJCIECH KACALAK