CURRICULUM VITAE

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SUMMARY OF QUALIFICATIONS

Accomplished and enthusiastic Physicist with emphasis in neuro and bioinformatics and significant experience in the biomagnetic inverse problem. This experience has resulted in the development of a new source localization method (swLORETA) and a software package that provides various functions to study continuous and event-related activity recorded with electroencephalography/magnetoencephalography including techniques to perform frequency analysis, coherence and phase synchronization measures, and a selection of neuroimaging methods for source analysis. Fluent in Spanish and English and French.

EDUCATION

PhD Biomedical Engineering, **TECHNISCHE UNIVERSITÄT ILMENAU**, 2016.
Dissertation Title: ***Functional Imaging based on swLORETA and phase synchronization.***
Supervisor: Prof. Dr.-Ing. habil. Jens Haueisen.

B.S Physics, Habana University, 2002
Dissertation Title: ***Estudio computacional de la estructura de bandas de los Cd_3TeO_6 y $CdTeO_3$***
Supervisor: PhD, Eduardo Ariel Menéndez Proupin

Postgraduate Studies

Generalized Functions Theory. (2001, Havana University).

Advanced Solid State Physics. (2001, Havana University).

Molecular Biology. (2002, CIGB).

Immunology. (2002, CIGB).

Introduction to Computational Proteins Modeling. (2002, CIGB).

Martingalas and Statistics Applications. (2003, Havana University).

Markov Chain Monte Carlo methods. (2003, Havana University).

BESA Workshop c//m//t-Computer & Management TrainingsGmbH, (2005, Munich/Germany).

ASA Workshop by doctor Frank Zanow (2005, Berlin).

LANGUAGES

Fluent in Spanish, English and French.

PREVIOUS EMPLOYMENTS AND PROFESIONAL EXPERIENCES

Branch manager in Europe involved in product development and customer support/training.
Applied Neuroscience Inc, USA
(Since 01.03.2014)

Applied Neuroscience Inc is a company dedicated to the development of Quantitative EEG Software. The main software NeuroGuide allows doctors and research to make use of a normative database in order to compare a patient again a normal control group. Moreover, the company also provides the necessary software to perform Neurofeedback using the LORETA inverse solution. As branch manager in Europe I have been working in the development of different products as well as customer support and training. Moreover, I have also work in a mathematical framework for the computation of the flow of information that can provide the user to better understand the brain dynamics of different patients again a norm of healthy patients. I have been also being involved in the decisions of adopting the C++ and Qt framework for the development of platform independent applications such as NeuroLink and NeuroGuide.

Guest Scientist
Cognition & development Research Unit (CODE), Laboratory of Neurophysiology (NEFY), Brussels

Senior Scientific Developer
Eemagine Medical Imaging Solutions, Berlin,
Germany(2009-17.03.2014)

Eemagine Medical Imaging Solutions is dedicated to developing advanced systems widely used in neuroscience and neurodiagnostics. As a Senior Programmer I develop the tools that allow scientists and clinicians to record and analyze neurophysiological signals in neurological, physiological and clinical research. I also help to determine future lines of development and to promote scientific collaborations with different institutions. Currently, I am interested in the development of algorithms to determine the brain generators of the EEG/MEG signal in both the time and the frequency domains. As part of the ASA development team, I have gained great experience about the development of neurosciences software and EEG/MEG analysis tools.

Visiting Scientist
Service de Neurophysiologie Clinique Hôpital Roger Salengro CHRU de
Lille(2010-2012)

Visiting Scientist
Université Catholique de Louvain, Institut de Neuroscience (IoNS), Centre de Neuroscience Système et Cognition.
(2009-2010)

The Face Categorization Group at the Centre de Neuroscience Système et Cognition of the university catholique Louvain-la-Neuve, is a multidisciplinary group headed by Professor Bruno Rossion. The main research interest of the group is to understand how the human brain categorizes objects of the visual world. In particular the groups is interest in the visual perception and recognition of a fascinating category of objects: faces. As part of the group I develop new tools for the treatment of signal in neuroimaging and electrophysiology. I have put special emphasis in the development of new technique to analysis steady state evoke potential. During this period of time I have gain experience about the statistic method use in Neurosciences research especially in the topic of steady state evoke potential.

Research Specialist
Senior Programmer at Eemagine Medical Imaging Solutions, Berlin,
Germany(2006-2008).

Eemagine Medical Imaging Solutions is dedicated to developing advanced systems widely used in neuroscience and neurodiagnostics. As a Senior Programmer I develop the tools that allow scientists and clinicians to record and analyse neurophysiological signals in neurological, physiological and clinical research. I also help to determine future lines of development and to promote scientific collaborations with different institutions. Currently, I am interested in the development of algorithms to determine the brain generators of the EEG/MEG signal in both the time and the frequency domains. As part of the ASA development team I have gained great experience about the development of neurosciences software and EEG/MEG analysis tools.

Visiting Scientist
Institute of Medicine (Deep Brain Stimulation and Magnetoencephalography Group), Research Center Jülich – Jülich, Germany
August 2004 – 2006.

The Deep Brain Stimulation and Magnetoencephalography (MEG) Group at the Institute of Medicine, Research Center Jülich, is a multidisciplinary group headed by Professor Peter Tass, which focuses on the development of novel methods for brain mapping under healthy and pathological conditions, using principles of synchronization and nonlinear dynamics. Mine work in this group has involves several projects, including:

- Developing a method to solve the biomagnetic inverse problem. Our interest lies in the identification of electro/magnetoencephalogram (EEG/MEG) generators, that is, the distribution of current sources inside the brain, which generate the fields measured over an array of sensors distributed on the scalp surface. To do this, it is necessary to apply regularization techniques like Thikonov regularization, due to the non-uniqueness of the solution. I have introduced a modification to a well-established method called sLORETA, which produces more stable solutions with respect to the noise present in real data. This

new method also improves our ability to detectcurrent sources from deep in the brain.

- The development of new data analysis methods for studying the behaviour of oscillatory processes, with applications to experiments that study brain activity during visual stimulation. We have applied the inverse solution method I have developed, combined with methods from nonlinear dynamics. In this approach we have considered the populations of neurons as interacting dynamical systems. We then applied various analysis methods from nonlinear dynamics, such as phase synchronization analysis, to identify the brain structures involved in response to visual stimulation.
- The development of signal processing and analysis software for use in EEG/MEG experiments. This package is intended to go from the raw data to the reconstructed current sources. Additionally, it computes synchronization measures between different brain structures, and also between different sensor measurements. Furthermore, it has the capabilities to filter and average the data, aswell as to perform the forward solution of the biomagnetic problem for purposes of simulation studies. This software is now the core of the MEG data analysis platform used by the group.

Junior Scientist
Catalysis Group, Cuban Petroleum Research Center, Havana Cuba.
January 2003 – June 2004.

My work here was devoted to understanding the interaction between AlO and H2. For this, the molecular dynamics technique was applied to understand the diffusion of the hydrogen molecules through the AlO material. A potential describing the interaction between the hydrogen atoms in an H2 molecule was developed in order to apply the classical molecular dynamics technique. Moreover, different methods of quantum molecular dynamics were also applied to obtain more realistic results.

Junior Scientist
Neurophysics Group, Cuban Neuroscience Center.
September 2001 – December 2002.

My work here was primarily concerned with the development of inverse methods base on Bayesian inference theory. For this task a method called the Bayesian model comparison (BMA) method was developed by another member of the group. This method allows for an accounting of the uncertainty in assuming a given model is correct, and drawing conclusions from it, which is the usual practice for solving the EEG/MEG inverse problem. BMA allows us to compute posterior estimates of the current source density inside the brain unconditionally for any model considered. In order to explore all the possible models, several techniques can be used. In particular, I implemented a Markov Chain Monte-Carlo technique to sample the space of all possible models in an optimal way.

TECHNICAL SKILLS

Programming – Experience in C, C++ (including the Standard Template Library), C++11, Qt, .Net, JAVA, Fortran, Matlab, Mathematic, Octave, Python, Bash/Bat Script Language, OpenGL, Direct3D, XNA. Experience in mathematical programming such as molecular dynamics simulations and inverse techniques. I have written software packages for MEG/EEG data processing and current source modelling. This includes several inverse solution methods and a novel technique named swLORETA. Furthermore, this package is capable of analyzing synchronization processes between the different brain structures and with external signals such as EMG.

Desktop publishing – In addition to experience with standard office applications such as MS Office and Open Office, I also have considerable experience with professional publishing tools such as TeX and LaTeX. I am also experienced in web design and HTML authoring.

Computer hardware – Experience in building, maintaining, and supporting PC computer systems. Extensive knowledge of the Windows 2000 and XP, Linux and Solaris operating systems, as well as PC hardware. Especially proficient at troubleshooting and general computer problem solving.

PUBLICATIONS

B.S. Dissertation.

E. Palmero-Soler, Computational study of the band structure of the compounds Cd3TeO6 and CdTeO3. Bs. Dissertation (University of Havana, 2002).

Peer Reviewed Journals.

1. Alonso-Prieto E., **Palmero-Soler E**., Cuspineda-Bravo E., Cordero-Eiriz A., Trujillo-Barreto N., Trujillo-Matienzo C., Fernandez-Concepcion O., Jimenez-Conde A. *Cognitive diagnosis of cerebrovascular diseases by event related potentials: anatomical sources that generate P300*. Revista Neurologia 2004; 38: (03:229-33).

2. Menéndez-Proupin E., Gutiérrez G., **Palmero-Soler E.**, Ordejon P., Peña J. L., *Electronic structure of crystalline binary and ternary Cd-Te-O compounds*. Physical Review B 70, 035112 (2004).

3. Alonso-Prieto E., **Palmero-Soler E.**, Trujillo-Matienzo C., Cuspineda-Bravo E., Suarez-Luis I. *Even-related potentials and the diagnosis of short-term verbal memory disorders in cerebrovascular disease*. Revista Neurologia 2004; 39 (6): 521-524.

4. Alonso-Prieto E., Michel-Esteban E., Trujillo-Matienzo C., **Palmero-Soler E.** *Influence of levodopa on cognition of idiopathic in Parkinson's disease*. Neurologia; 2004; 19(10):710-8.

5. **Palmero-Soler, E.**, Dolan, K., Hadamschek, V., Tass, P.A. *swLORETA: a novel approach to robust source localization and synchronization tomography*. Physics in Medicine and Biology 52 (2007).

6. Alonso Prieto E., Barnikol U., **Palmero-Soler E**., Dolan K., Hesselmann G., Mohlberg H., Amunts K., Zilles K., Niedeggen M., Tass P. A. *Timing of V1/V2 and V5+ activations during coherent motion of dots: an MEG study.* NeuroImage 37 (2007).

7. Maurage P., Philippot P., Joassin F., Pauwels L., Pham T., Alonso-Prieto E., **Palmero-Soler E**., Zanow F., Campanella S. *The auditory-visual integration of anger stimuli is impaired in alcoholism: An ERP study*. J Psychiatry Neurosci. 2008 March; 33(2):111– 122

8. Cebolla A., Saedeleer C., Bengoetxea A., Leurs F., Balestra C., d'Alcantara P., **Palmero-Soler E.**, Dan B., Cheron G. *Movement gating of beta/gamma oscillations involved in the N30 somatosensory evoked potential*. Human Brain Mapping 30:1568– 1579 (2009).

9. Cheron G., Cebolla A., Petieau M., Bengoetxea A., **Palmero-Soler E.**, Leroy A., Dan B.*Adaptive changes of rhythmic EEG oscillations in space: Implications for Brain-Machine-Interface applications.* International Review of Neurobiology 86 (2009).

10. Kuefner, D., de Heering, A., Jacques, C., **Palmero-Soler, E**. & Rossion, B. (2010). *Early visually evoked electrophysiological responses over the human brain (P1, N170) show stable patterns of face-sensitivity from 4 years to adulthood*. Front. Hum. Neurosci.doi:10.3389/neuro.09.067.2009.

11. Cebolla AM, **Palmero-Soler E**, Dan B, Cheron G. *Frontal phasic and oscillatory generators of the N30 somatosensory evoked potential*. Neuroimage. 2011 Jan 15;54(2):1297-306. doi: 10.1016/j.neuroimage.2010.08.060. Epub 2010 Sep 8.

12. Bocquillon P, Bourriez JL, **Palmero-Soler E**, Betrouni N, Houdayer E, Derambure P, Dujardin K. *Use of swLORETA to localize the cortical sources of target- and distracter-elicited P300 components.* Clin Neurophysiol. 2011 Oct;122(10):1991-2002. doi: 10.1016/j.clinph.2011.03.014. Epub 2011 Apr 13.

13. Bocquillon P, Bourriez JL, **Palmero-Soler E**, Destée A, Defebvre L, Derambure P, Dujardin K. *Role of basal ganglia circuits in resisting interference by distracters: a swLORETA study*. PLoS One. 2012;7(3):e34239. doi: 10.1371/journal.pone.0034239. Epub 2012 Mar 28.

14. Cheron G, Leroy A, **Palmero-Soler E**, De Saedeleer C, Bengoetxea A, Cebolla AM, Vidal M, Dan B, Berthoz A, McIntyre *J. Gravity influences top-down signals in visual processing*. PLoS One. 2014 Jan 6;9(1):e82371. doi: 10.1371/journal.pone.0082371. eCollection 201

15. Cebolla AM, Palmero-Soler E, Dan B, Cheron G. Modulation of the N30 generators of the somatosensory evoked potentials by the mirror neuron system. Neuroimage. 2014 Jul 15;95:48-60. doi: 10.1016/j.neuroimage.2014.03.039. Epub 2014 Mar 22.

16. Perrine Bocquillon, Jean-Louis Bourriez, **Ernesto Palmero-Soler**, Luc Defebvre, Philippe Derambure, Kathy Dujardin. *Impaired Early Attentional Processes in Parkinson's Disease: A High-Resolution Event-Related Potentials Study*. July 2, 2015 DOI: 10.1371/journal.pone.0131654

17. Thatcher RW, **Palmero-Soler E**, North DM, Biver CJ. *Intelligence and EEG measures of information flow: efficiency and homeostatic neuroplasticity.* Sci Rep. 2016 Dec 20;6:38890. doi: 10.1038/srep38890.

Conference Proceedings.

Trujillo-Barreto N., **Palmero-Soler E**., Melie L., Martínez E. 2003. *MCMC for Bayesian Model Averaging in EEG/MEG imaging*. Presented at the 9th International Conference on Functional Mapping of the Human Brain, June 19-22, 2003, New York, NY. Available on CD-Rom in NeuroImage, Vol. 19, No. 2.

Menéndez-Proupin E., Gutiérrez G., **Palmero-Soler E.**, Peña JL, *Electronic structure of binary and ternary components of CdTe:O thin films*, Phys. Stat. Sol. (c) 1, No. S1, S104 S107 (2004) / DOI 10.1002/pssc.200304873 (CLACSA Memories)

Palmero-Soler E., Hadamschek V., Dolan K., Dammers J. and Tass A. P. 2005. *A comparison of the sLORETA method in the presence of noise with different prior functions*. Presented at the 11th International Conference on Functional Mapping of the Human Brain, June 12-16, 2005, Toronto, Canada. Available on CD-Rom in NeuroImage, Vol. 26, No. 1.

Alonso-Prieto Esther, Barnikol, U., **Palmero-Soler E**., Dammers J., Fieseler T., Wuttich S., et al. *Temporal dynamics of visual motion processing in human cortical areas V1 and V5: a MEG study*. Presented at the 11th International Conference on Functional Mapping of the Human Brain, June 12-16, 2005; Toronto, Canada. (Available on CD-Rom in NeuroImage, Vol 26, No1.)

Palmero-Soler E., Majtanik M., Dolan K., Alonso-Prieto E., Aubert-Vazquez E., Mohlberg H., Zilles K., Amunts K. and Tass P. A. *Synchronization tomography based on an inverse calculation with sDEEP*. Presented at the 12th International Conference on Functional Mapping of the Human Brain, Florence, Italy, 2006.

Alonso-Prieto Esther., **Palmero-Soler, E**.; Majtanik, M.; Dolan, K.; Mohlberg, H.; Amunts, K.; Rottschy, C.; Aubert-Vázquez, E.; Zilles, K.; Niedeggen, M.; Tass, P. A. *Phase synchrony among ventral and dorsal visual streams during the integration of form and motion information*. Presented at the 12th International Conference on Functional Mapping of the Human Brain, Florence, Italy, 2006.

Alonso-Prieto Esther, **Palmero-Soler E.**, Kanev J., Zanow., Martinez A. *Alpha and theta evoked brain oscillations underlie object selective attention processes* (Brain Topography, 2008, 20, 165-180).

Alonso-Prieto Esther, **Palmero-Soler E.**, Martinez A., Haueisen J., Zanow F. *Neural correlates of attention dependent brain oscillations in the human brain*. (European Archives of Psychiatry and Clinical Neuroscience, Vol 257 Supplement 2 December 2007, pp29-30)

Palmero-Soler E., Alonso-Prieto E., Zanow F. *Where in the Brain? swLoreta*. (European Archives of Psychiatry and Clinical Neuroscience, Vol 257 Supplement 2 December 2007, pp29-30).

Alonso-Prieto, E. Caharel, S., Dricot, L., **Palmero-Soler, E.**, & Rossion, B. (2009). *The Neural Sources of the Face-Sensitive N170 Event-Related Potential*. Psychophysiology, 46 supplement 1, S101.

Kuefner, D., de Heering, A., Jacques, C., **Palmero-Soler, E**. & Rossion, B. (2010). *Early visually evoked electrophysiological responses over the human brain (P1, N170) show stable patterns of face-sensitivity from 4 years to adulthood*. Vision Sciences Society. Naples: Florida.

Boremanse A., **Palmero-Soler E**., Jacob B., Rossion B. (2010). *Robust visual adaptation to face identity over the right occipito-temporal cortex: a steady-state visual potential approach*. Vision Sciences Society. Naples: Florida.

Kuefner, D., de Heering, A., Jacques, C., **Palmero-Soler, E**. & Rossion, B. (2010). *Early visually evoked electrophysiological responses over the human brain (P1, N170) show stable patterns of face-sensitivity from 4 years to adulthood*. Workshop on Concepts, Actions, and Objects: Functional and Neural Perspectives (4th Edition). Italy: Rovereto.

Boremanse A., **Palmero-Soler E**., Jacob B., Rossion B. (2010). *Robust visual adaptation to face identity over the right occipito-temporal cortex: a steady-state visual potential approach*. Workshop on Concepts, Actions, and Objects: Functional and Neural Perspectives (4th Edition). Italy: Rovereto.

SEMINARS AND TALKS

Invited Talks.

Palmero-Soler E., Mendez-Proupin E., *Bands Structure of the Cd-Te-O compounds*. IX Symposium to the Cuban Physics Society, Havana Cuba, April 11, 2002.

Trujillo N., **Palmero-Soler E.**, Martínez E., Cuspineda E., Melie L., *Bayesian Inference and Model Averaging in EEG/MEG Imaging*. Workshop on bioinformatics Cuba-U.K, Havana Cuba 2002.

Trujillo N., **Palmero-Soler E.**, Martínez E., Cuspineda E., Melie L., *MCMC model averaging in EEG/MEG imaging*. Symposium on bioinformatics Cuba-France, Havana Cuba 2003.

Alonso-Prieto E., **Palmero-Soler E**., *Neuropsychological diagnostic: new perspectives.* First meeting between Cuban research institutes, Havana 2003.

Palmero-Soler E., Alonso-Prieto E. sLORETA: *A new approach for source localization*. 10th Workshop on Optimization and Inverse Problem in Electromagnetism. Ilmenau, Germany, 2008.

Palmero-Soler E. *swLORETA: Theoretical aspects*. 19th Neuromeeting Bourgogne 2010 Beaune.

Palmero-Soler E. *Brain Connectivity: Theoretical aspects*. 23th Neuromeeting Bourgogne 2014 Beaune.

Contributed Talks.

Valdes P., **Palmero-Soler E.**, Trujillo N., Martínez E., Melie L., *Image Fusion for Concurrently Recorded Spontaneous EEG and fMRI*. Statistics Society Congress of Hamilton, Canada (SSC). May 26th − 29th, 2002.

Valdes P., Trujillo N., Martínez E., **Palmero-Soler E**., Melie L., *Nonseparable Spatio-Temporal Modeling of 4D Neuroimages*. Human Brain Mapping. Japan, June 2-6, 2002.

Valdes P., **Palmero-Soler E.**, Trujillo N., Martínez E., Melie L., *EEG/fMRI Image Fusion in the Time, Frequency and Time/Frequency Domain*. Symposium on Multimodal Neuroimaging Approaches. Sendai Japan, June 20, 2002

Characterization of flash visual evoked responses in healthy volunteers using the Cognitrace LED flash stimulator. Cognitrace Usermeeting, Brussels, (2006).

Alpha and theta evoked brain oscillations underlie object selective attention processes. 16 Deutschen EEG/EP-Mapping Meetings, Magburg, Germany, (2007).

Electromagnetic brain source localization. Advance Source Analysis Usermeeting, Brussels, (2007); San Diego, (2007).

Bocquillon P., **Palmero-Soler E**., Betrouni N., Bourriez JL., Derambure P, Dujardin K. *Localization of the P300 cortical generators with swLORETA*. 19th Neuromeeting Bourgogne 2010 Beaune.

Bilbaut N., Bocquillon P., **Palmero-Soler E**., Bourriez JL., Derambure P., Szurhaj W. *A study ofthe mirror neurons systems with swLORETA*. 19th Neuromeeting Bourgogne 2010 Beaune.