updated on October 2006

Curriculum Vitae of Michele Giugliano

Personal data

Name and Surname:	Michele Giugliano
Birth date and Place:	August 5th, 1974, Genova (Italy)
Marital Status:	single
Citizenship:	italian
Home address:	Länggassstrasse 40a/10, CH-3012 Bern, Canton Bern, Switzerland
Working permit:	permit B since 2001 (soon *residence permit C)*.
Working address:	Laboratory of Neural Microcircuitry, Brain Mind Institute, Faculty of Life Sciences, Ecole Polytechnique Fédérale de Lausanne Station 15, CH-1015 Lausanne, Switzerland
email:	mgiugliano@gmail.com
webpage:	http://www.giugliano.info

Current Position

2005-: junior group leader of the Neuroelectronic Interfacing Group (composed of 2 PhD students) in the laboratory of Prof. Henry Markram, Brain Mind Institute, EPFL, Lausanne (CH).

Education and Degrees

2001: Polytechnic of Milan, (I): *PhD in Bioengineering*.

1998: Univ. of Genova, (I): *habilitation as chartered Engineer*, (1st rank – score 110/110).

1997: Univ. of Genova: *Laurea in Electronic Engineering (specialized in Biomedical Eng.)*, grade 1st class (score: 110/110 cum laude).

1992–1997: Univ. of Genova: *Electronic Engineering "Laurea"*, 5-years curriculum of undergraduate studies, *MEng* equivalent.

1992: Liceo M. Champagnat, Genova: *Diploma di Maturità Scientifica*
(5 years, high school diploma equivalent) - (score: 57/60).

Previous Research Experience

2001-2005: postdoctoral fellow in the laboratory of Prof. H.-R. Lüscher at the Inst. of Physiology, Univ. of Bern (CH).

1999: visiting doctoral student in the group of Dr. Gwendal Le Masson of the Laboratory for Physiopathology for Neuronal Spinal Cord Research, INSERM, Inst. de Neuroscience F. Magendie, Bordeaux (F).

1999: visiting doctoral student in the laboratories of Drs. Andrea Nistri and Enrico Cherubini at Biophysics Sector of SISSA, International School for Advanced Studies, Trieste (I).

1997–2001: predoctoral fellow in the laboratory of Prof. Massimo Grattarola at the NeuroEngineering and BioNanoTech Group, Dept. of Biophysical and Electronic Engineering, , Univ. of Genova (I).

1997–1998: visiting doctoral student in the laboratory of Prof. Rodney J. Douglas and Prof. Kevan Martin at Inst. of Neuroinformatics, ETH and Univ. of Zürich (CH).

1995–1996: undergraduate student at the Cellular Differentiation Laboratory of Prof. Ranieri Cancedda, Advanced Biotechnology Center, Genova (I).

Honors, Awards and Grants

2006: *European Commission:* co-principal investigator with Prof. H. Markram (460 Keuro, 3 years)

2005: *Swiss National Sci. Foundation:* co-principal investigator with Prof. H.-R. Lüscher (600 Kchf)

2003: *Swiss Physiological Society:* "Asher-Hess Young Investigator Award" – 2nd prize

2001–04: *Human Frontier Science Program, France:* Long-term Fellowship award (3 years)

1997: *Univ. of Genova:* Worthiness of Publication and Highest Honors for the Master Thesis

2004: *Italian Society for Neurosci.:* Travel grant for participating to the FENS Congress

1997–99: *Univ. of Genova:* Travel grants for the "training of Ph.D. students"

1998: *Polytechnic of Milan(I):* Natl. exam for admission to PhD courses, 1st rank (score:114/120)

1997: *Univ. of Genova (I)*: Natl. exam for admission to PhD courses, 1st rank (score:114/120)

Courses and Scientific Training

2005: Laboratory Animal Science - Fed. Swiss Cantonal Veterinary Officers (FELASA-Cat. C)

2005: selected applicant to the *School of Dendrites*, 13th Jerusalem School in Life Sciences.

2004: Laboratory Animal Science - Fed. Swiss Cantonal Veterinary Officers (FELASA-Cat. B)

2002: *3rd Course on Multi-Electrode-Array (MEA) recording*, Reutlingen (D).

2001: selected applicant to the *International School on Biophysics of Ion Channels and Channelopathies*, Venice (I), by the Italian Society for Pure and Applied Biophysics.

2000: selected applicant to the *Workshop on Neuromorphic Engineering*, Telluride (US).

1999: selected applicant to the *International Summer School of the IEEE Engineering in medicine and Biology Society*, Siena (I).

1999: selected applicant to the *EC Course in Computational Neuroscience*, Heraklion (Crete).

1997–2001: Polytechnic of Milan (I), PhD in Bioengineering: yearly schools on bioengineering.

1997–1998: semester courses at the ETH, Zürich: "Computation in Neuromorphic Analog VLSI Systems" (Dr. Giacomo Indiveri) and "Biophysics of Neural Computation: Introduction to Neuroinformatics" (Prof. Kevan Martin and Prof. Rodney Douglas).

Invited Talks & Seminars

2006: European Brain Research Institute, Rome (I).

2006: Okinawa Computational Neuroscience Course, Okinawa (Japan).

2006: European School of Neuro-IT and Neuroengineering, Genova (I).

2005: Congress of the Italian Society for Neurosciences, Ischia (I).

2005: QinetiQ Workshop (UK) "The demonstration and analysis of learning in neuronal networks."

2005: Complex Systems Unit, Department of Technologies and Health, Italian National Institute of Health, Rome (I).

2004: Laboratory of Computational Neuroscience, BMI, EPFL Lausanne.

2004: Neurobiology and Biophysics Group, Institut für Biologie III, Albert-Ludwigs Universität Freiburg (D).

2003: Univ. of Genova: invited lecturer for a semester (“Professore a Contratto”) at the Faculty of Biomedical Engineering.

2003: Neural Microcircuitry Laboratory, BMI, EPFL Lausanne (CH).

2001-2002: NeuroEngineering Workshop & Advanced School, Univ. Genova (I).

2001: Congress of the Italian Society for Neurosciences, Torino (I).

2000: Department of Communication, Computer and System Sciences, Univ. of Genova (I)

Teaching Experience

Graduate

2006: Okinawa Computational Neuroscience Course, Okinawa (Japan), tutoring of practical projects

2001,2002,2006: European School of Neuro-IT and Neuroengineering, Genova (I), teaching basics of Cellular Electrophysiology, Neurophysiology, Biophysics and Computational Neuroscience.

2005: “BeNeFri” PhD Programme in Neuroscience, Universities of Bern, Fribourg and Neuchatel: teaching basics of Cellular Electrophysiology and Neurophysiology.

2000: Cycle of seminars on Neuroinformatics and Computational Neuroscience, Univ. of Genova (I), teaching Computational Neuroscience.

Undergraduate

2001 – 2005: University of Bern, Faculty of Medicine: Teaching assistant and Lecturer for practical laboratory courses in Physiology.

2003: University of Genova, Faculty of Biomedical Engineering: Invited Lecturer for a semester (“Professore a Contratto”), course title “Advanced Mathematical Modeling of Neuronal Networks”

1997-2002: University of Genova, Faculties of Electronic and Biomedical Engineering: Teaching assistant and Lecturer for the courses “Bioelectrochemistry and Biomedical Technologies”, “Bioelectronics”; supervision of monographic semester practical projects and of several master theses projects on the topic of Computational Neuroscience.

1998: European Centre for University Exams Training, Genova (I): Part-time private consulting activity on teaching “Control Theory and Optimization”.

Direction of theses and students supervision

2005-2006: Brain Mind Institute: design and supervision of the semester and (master) thesis projects of five undergraduate students (Jessie Lowell, Rishabh Jain, Patrick Marcacci, Imad Riachi, Corrado Cali’).

1998-2003: University of Genova: design and supervision of the (master) thesis projects of five undergraduate students (Maura Arsiero, Cristian Carmeli, Leonardo Badino, Giuseppe Iarossi, Ilaria Bernardi), in the field of Computational Neuroscience, Network-level theoretical electrophysiology and Cellular Electrophysiology. I also designed and supervised more than 20 monographic, semester and lab research projects on the same topics.

Teaching interests

In the context of undergraduate and graduate teaching, and because of my heterogeneous background and scientific training, I can contribute to teaching conventional subjects such as Neurobiology, Cellular Electrophysiology and Neurosciences. I can contribute to teaching of Theoretical Neurobiology and Applied Mathematics, and to subjects at the interface between (nano)technology, mathematics, electronics, biophysics, electrophysiology and cellular neurosciences. The last disciplinary area might identified as “Bioelectronics and Neuroengineering”, include the interaction of electrically excitable cells with silicon-based devices (e.g. field-effect transistors, substrate thin-film transducers) and nano- particles and devices (e.g. conductive meshes of nanowires, carbon-nanotubes, etc.). Mathematical modeling techniques, the numerical methods and Mean-Field descriptions and mathematical analytical tool are also a field of my expertise.

Administrative and other scientific duties

2005–2006: I qualified as authorized “person responsible for leading and carrying out animal experimentation”, obtaining three legal licenses for animal experimentation from the Cantonal Veterinary Institutions.

2005: Congress of the Italian Society for Neurosciences, Ischia (I), mini-symposium organizer.

2004–2006: I acted as an expert reviewer for the *Swiss National Science Foundation*.

2000–2006: I acted as a reviewer for the following journals: *Neural Computation* (MIT Press), the *European Journal of Neuroscience* (Blackwell Publisher), the *Journal of Neurophysiology* (APS publisher), the *Journal of Computational Neuroscience* (Elsevier Publisher), the *Medical and Biological Engineering and Computing* (IEE Publisher), and the *IEEE Trans. on Neural Networks* (IEEE).

2005: “BeNeFri” PhD Programme in Neuroscience, Universities of Bern, Fribourg and Neuchatel: course organizing committee.

2003: I was nominated external member of a commission during the defense of a Master Thesis, at the University of Neuchatel, Neuchatel (CH).

2001: Workshop “Neuroengineering intensive course”, University of Genova, Organizing Committee.

1999: Workshop “Neuroscienze in vitro: contributi della Bioingegneria”, University of Genova / Center for Advanced Biotechnology, Organizing Committee.

Memberships to Research and Scientific Societies

2005 to present: Italian National Group of Bioengineering.
2004 to present: American Physiological Society.
2003 to present: Swiss Physiological Society.
2002 to present: American Society for Neuroscience; Swiss Society for Neuroscience;
AIIMB - Italian Association of Medical and Biological Engineering.
2000 to present: Italian Society for Neuroscience and Federation of European Neurosci. Soc.

Languages

1995: Abon Language School, Bristol (UK): English course attended.
1996: T.O.E.F.L. (Test for English as a Foreign Language), score: 620.
2001-2003: Volkhochschule, Bern (CH).
2005: Media Center of the EPFL, Lausanne (CH).

Michele Giugliano is an Italian native speaker, and he has fluent English oral skills and excellent written skills in technical/scientific English. He has very basic knowledge of oral and written German and French.

Publications

(electronic reprints are available at http://www.giugliano.info/pubs.htm)

A – Manuscripts in preparation or submitted to peer-reviewed journals

A1. CILIA, E., GAMBAZZI, L., RIACHI, I., MARKRAM, H., PRATO, M., GIUGLIANO, M, AND BALLERINI, L.
Active reduction of electrotonic dendritic distances and its impact on network synchronizations in hippocampal neuronal networks coupled to carbon nanotube conductive culture substrates. (in preparation).

A2. CALI', C., MARKRAM, H. AND GIUGLIANO, M.
Frequency Response Analysis and its application in networks of electrically coupled cells, (in preparation).

A3. ARSIERO, M., LÜSCHER, H.-R., LUNDSTROM, B.N. AND GIUGLIANO, M.
The Impact of Input Fluctuations on the Frequency-Current Relationships of Layer 5 Pyramidal Neurons in the Rat Medial Prefrontal Cortex, (submitted).

A3. KÖNDGEN, H., GEISLER, C., FUSI, S., X.-J. WANG, LÜSCHER, H.-R., GIUGLIANO, M.
Cortical population response to time-varying noisy inputs and the dynamical response properties of *in vitro* neocortical neurons, (submitted).

B – Original publications appeared or in press on peer-reviewed journals

B1. BERGER, T., LÜSCHER, H.-R. AND GIUGLIANO, M. (2006)
Transient Rhythmic Activity in the Somatosensory Cortex Evoked by Distributed Input *in vitro*. ***Neuroscience*** 140(4), 1401-13, ***[if: 3.41]***.

B2. GIUGLIANO, M., DARBON, P., ARSIERO, M., LÜSCHER, H.-R. AND STREIT, J. (2004)
Single-neuron discharge properties and network activity in dissociated cultures of neocortex.
Journal of Neurophysiology 92:977-96, ***[if: 3.853, cited 10 times]***.

B3. REUTIMANN, J., GIUGLIANO M. AND FUSI, S. (2003)
Event-driven simulation of spiking neurons embedded in very large networks.
Neural Computation 15(4):811-30, ***[if: 2.591, cited 10 times]***.

B4. GIUGLIANO, M., GRATTAROLA, M., AND LEMASSON, G. (2001)
Electrophysiological activity to cell metabolism signal transduction: possible feedback regulatory biochemical pathways. ***Neurocomputing*** 38-40:23-30, ***[if: 0.79]***.

B5. GIUGLIANO, M., BOVE, M. AND GRATTAROLA, M.
Insulin release at the molecular level: metabolic-electrophysiological modelling of the pancreatic beta-cells. ***IEEE Transaction on Biomedical Engineering*** 47(5):611-23, 2000 ***[if: 1.857, cited 7 times]***.

B6. GIUGLIANO, M. (2000)
Synthesis of generalized algorithms for the fast computation of synaptic conductances with markov kinetic models in large network simulations. ***Neural Comp.*** 12(5):771-99, ***[if: 2.591, cited 2 times]***.

B7. GIUGLIANO, M., BOVE M. AND GRATTAROLA, M. (1999)

Fast Calculation of Short-Term Depressing Synaptic Conductances.
Neural Computation 11(6):1413-26, ***[if: 2.591, cited 7 times]***.

B8. GIUGLIANO, M., BOVE M. AND GRATTAROLA, M. (1999)
Activity-driven Computational Strategies of a Dynamically Regulated Integrate-and-fire Model Neuron. ***Journal of Computational Neuroscience*** 7(3):247-54, ***[if: 2.359, cited 3 times]***.

B9. GRATTAROLA, M., BOVE, M., VERRESCHI, G., AND GIUGLIANO, M. (1997)
Signal analysis of simulated experiments: in vitro synchronized activity of networks of neurons coupled to arrays of planar microelectrodes. ***Journal of Cellular Engineering*** 2(4):154-60, (now *Med. Biol. Eng. Comp.*) ***[if: 1.028]***.

B10. BOVE, M., MARTINOIA, S., VERRESCHI, G., GIUGLIANO, M. AND GRATTAROLA, M. (1998)
Analysis of the signals generated by networks of neurons coupled to planar arrays of microtransducers in simulated experiments. ***Biosensors and Bioelectronics*** 13:601-12, ***[if: 3.463, cited 9 times]***.

C – Reviews appeared or in press on peer-reviewed journals

C1. ARSIERO, M., LÜSCHER, H.-R. AND GIUGLIANO, M. (2007)
Real-time Closed-Loop Electrophysiology: towards new frontiers in *in vitro* investigations in the Neurosciences. ***Arch. Ital. Biol.*** (in press), ***[if: 0.692]***.

D – Original publications appeared as peer-reviewed Conference Proceedings

D1. GIUGLIANO, M., LA CAMERA, G., RAUCH, A., LÜSCHER, H.R. AND FUSI, S. (2002)
Non-monotonic Current-to-Rate Response Function in a novel Integrate-and-Fire Model Neuron, *Proc. 12th Intl. Conf. on Artificial Neural Networks – ICANN 2002*, Madrid (Spain), as *Artificial Neural Networks - ICANN 2002*, LNCS 2415, (Dorronsoro, J.R. ed.), Springer-Verlag, Heidelberg, ***[if: 0.402, cited 2 times]***.

D2. REUTIMANN, J., GIUGLIANO, M. AND FUSI, S. Event-driven simulation of spiking neurons embedded in very large networks, *Proc. World Congress on Neuroinformatics*, (Rattay, F. ed.), ARGESIM/ASIM Verlag, Vienna (Austria), 2001.

E – Contributed Book Chapters

E1. GIUGLIANO, M., ARSIERO, M., DARBON, P., STREIT, J., AND LÜSCHER, H.-R. (2006)
Contributions of mathematical modelling and novel electrophysiological protocols to Network Neurosciences. In *Advances in Network Electrophysiology using Multi-Electrode Arrays*, (Taketani, M. and Baudry, M. eds.), Kulwer Academic Publisher.

E2. GIUGLIANO, M., ARSIERO, M. (2006)
Biological Neuronal Networks.
In *Wiley Encyclopedia of Biomedical Engineering*, (Akay, M. ed.), John Wiley & Sons, Inc.

E3. GIUGLIANO, M. AND MARTINOIA, S. (2006)
Substrate Arrays of Microelectrodes for *in vitro* Electrophysiology.
In *Wiley Encyclopedia of Biomedical Engineering*, (Akay, M. ed.), John Wiley & Sons, Inc.

E3. GIUGLIANO, M.
Single-neuron discharge properties and network activity in dissociated cultures of neocortex.

In NEUROMAT III Proceedings Book: Aquilano, D., Bezzi, M., Capasso,V., Micheletti, A., Naldi, G., Nieus, T., Rizzo, O., Sala M. eds., Milan Research Centre for Industrial and Applied Mathematics, 2005, ISBN: 88-7488-109-6.

E4. GIUGLIANO, M., PISCIOTTA, M., GRATTAROLA, M., AND JAHNSEN, H. (2002)
In vitro induction of activity-dependent network plasticity by means of substrate arrays of 3D microelectrodes, in hippocampal brain slices, in *Recent Research Developments in Biomedical Engineering I*, pp 1-14, (Pandalai, S.G. ed.), Transworld Research Network Publisher, Trivandru (India), ISBN: 8-17895-013-8.

E5. SANGUINETI, V., GIUGLIANO, M., GRATTAROLA, M. AND MORASSO, P. (2001)
Neuro-Engineering: from neural interfaces to biological computers.
In *Communications through virtual technologies: Identity, Community and Technology in the Communication Age*, (Riva, G. and Davide, F. eds.), IOS Press Amsterdam, The Netherlands, ISBN: 1-58603-162-7.

E6. BOVE, M., GIUGLIANO, M. AND GRATTAROLA, M. (1999)
Regulatory effects of long-term biochemical processes in integrate-and-fire model neurons, in Neural Circuits and Networks, in *Neural Circuits and Networks*, NATO ASI Series. Advanced Science Institutes Series SERS F Vol. 167, (Torre, V. and Nicholls, J. eds.), ISBN: 3-54064-929-8, Springer Verlag, Heidelberg Germany, 189-204.

E7. BOVE, M. , GRATTAROLA, M., MASSOBRIO, G., GIUGLIANO, M. AND MARTINOIA, S. (1998)
Dynamics of networks of biological neurons: simulation and experimental tool.
In *Algorithms and Architectures*, (Leondes, C.T. ed.), vol. I, 401-423, Academic Press, San Diego, ISBN: 012443861X, 1998.

F – Selected Abstracts to International Conferences

F1. GIUGLIANO, M., ARSIERO, M., DARBON, P., STREIT, J. AND LÜSCHER, H.-R. Emerging Network Activity in Dissociated Cultures of Neocortex: Novel Electrophysiological Protocols and Mathematical Modelling, Proc. of the ‘Modeling the Brain’s Labyrinth’, 10th year anniversary meeting for the EU course in computational neuroscience, Sep 2006, Crete.

F2. ARSIERO, M., LÜSCHER, H.-R., LUNDSTROM, B.N. AND GIUGLIANO, M. The impact of Input-Fluctuations on the Frequency-Current Relationships of Layer V Pyramidal Neurons in the Rat Medial Prefrontal Cortex, Proc. of the ‘Modeling the Brain’s Labyrinth’, 10th year anniversary meeting for the EU course in computational neuroscience, Sep 2006, Crete.

F3. GAMBAZZI L., GARCIA ALVAREZ S., RANJAN R., MARKRAM H. GIUGLIANO M. Revealing dynamical states of neural microcircuits using multi-site stimulation and recording techniques. *Proc. of the FENS Forum*, Vienna, 2006.

F4. SCHUERMANN F., GIDON A., JAN A., ABOU JAOUDÉ G., ANWAR H., SEGEV I., RIACHI I., FRYE J., KING J. G., SFYRAKIS K., HINES M., GIUGLIANO M., GOODMAN P., RANJAN R., LASSERRE S., DRUCKMANN S., HUSSAIN T., BANITT Y., SHAH S. Y. & MARKRAM H. The Blue Brain Project – A challenge for computer science. *Proc. of the FENS Forum*, Vienna, 2006.

F5. ARSIERO, M., LÜSCHER, H.-R. AND GIUGLIANO, M. Encoding afferent information in mPFC L5 pyramidal neurons, *Proc. of the FENS Forum*, Vienna, 2006.

F6. ARSIERO, M., LÜSCHER, H.-R. AND GIUGLIANO, M. The *mean-field dynamic-clamp*: linking single-neuron properties to network activity in *in vitro* preparations, *Proc. 35th SfN Annual Meeting*, Washington (US), 2005.

F7. GEISLER, C., KÖNDGEN, H., WANG, X.-J., FUSI, S., LÜSCHER, H.-R. AND GIUGLIANO, M. The dynamical response of single cells to a noisy oscillating current: What does it tell us about the single cell and network dynamics?, *Proc. 34th SfN Annual Meeting*, San Diego (US), 2004.

F8. KÖNDGEN, H., GEISLER, C., WANG, X.-J., FUSI, S., LÜSCHER, H.-R. AND GIUGLIANO, M. The dynamical response of single cells to noisy time-varying currents, *Proc. 34th SfN Annual Meeting*, San Diego (US), 2004.

F9. GIUGLIANO, M., ARSIERO, M., DARBON, P., STREIT, J., AND LÜSCHER, H.-R., Contributions to *in vitro* network neurosciences by MEAs and novel electrophysiological protocols, *Proc. of the SIMEA Meeting*, Reutlingen, oral presentation, 2004.

F10. GIUGLIANO, M., ARSIERO, M., DARBON, P., STREIT, J., AND LÜSCHER, H.-R., Single-neuron discharge properties and network activity in dissociated cultures of neocortex, *Proc. of the SIMEA Meeting*, Reutlingen, 2004.

F11. GIUGLIANO M. AND LÜSCHER H.R. Irregular *in vivo*-like background synaptic activity recreated in *in vitro* neocortical slices, *Proc. of the FENS Forum*, Lisbon, 2004.

F12. BERGER T., LÜSCHER H.R. AND GIUGLIANO M. Seizure-like rhythmic afterdischarges in cortical slices.", *Proc. of the FENS Forum*, Lisbon, 2004.

F13. ARSIERO M., DARBON P., LÜSCHER H. R., STREIT J. & GIUGLIANO M. Single-neuron discharge properties and network activity in dissociated cultures of neocortex, *Proc. of the FENS Forum*, Lisbon, 2004.

F14. GIUGLIANO, M., BERGER, T. AND LÜSCHER, H.-R. Reverberating Network Activity Induced by Distributed Electrical Stimulation in Neocortical Slices, *Proc. 33rd SfN Annual Meeting*, New Orleans (US), 2003.

F15. GIUGLIANO, M. AND LÜSCHER, H.R. Irregular *in vivo*-like background synaptic activity recreated in *in vitro* neocortical slices, *Proc. 6th IBRO World Congress Neurosci.*, Prague (Czech Republic), 2003.

F16. SANGUINETI, V., GIUGLIANO, M., GRATTAROLA, M. AND MORASSO, P. Technology for Neural Interfaces, *Proc. 1st Intl. Symp. Measurement, Analysis and Modeling of Human Functions*, Sapporo (Japan), 2001.

F17. GIUGLIANO, M., AND GRATTAROLA, M. Networks of real neurons with an artificial body, *Proc. Atlantic Symp. on Comp. Biology and Genome Information Systems & Technology*, Durham, (US), 2001.

F18. GIUGLIANO, M., BOVE, M., CHIAPPALONE, M., TEDESCO, M. AND GRATTAROLA, M. A mathematical model of the collective behaviour of embryonic neurons cultured *in vitro*, *Proc. 3rd European Biophys. Congress*, Munchen (Germany), as *European Biophysics Journal*, 29(4-5): 355, Springer-Verlag, Heidelberg, 2000.

F19. GIUGLIANO, M., BOVE, M. AND GRATTAROLA, M. A mathematical model of the collective behaviour of embryonic cortical neurons cultured *in vitro*, Proc*. European Medical & Biological Eng. Conf. EMBEC'99*, Vienna (Austria), as *IFMBE Journal Medical & Biological Engineering & Computing*, Vol. 37, 1182-1183, oral presentation, 1999.

F20. GIUGLIANO, M., BOVE, M. AND GRATTAROLA, M. Modelling and computer simulations of insulin release by a syncitium of pancreatic beta cells, *Proc. European Medical & Biological Eng. Conf. EMBEC'99*, Vienna (Austria), as *IFMBE Journal Medical & Biological Engineering & Computing*, Vol. 37, 1200-1201, oral presentation, 1999.

F21. BOVE, M., GIUGLIANO, M., AND GRATTAROLA, M. An Attempt at Introducing Dynamic Regulation into Integrate-and-fire Model Neurons, *Proc. Workshop on Neural Networks: from Biology to Hardware Implementation*, Chia, (I), 1996.

G – Selected Abstracts to National Conferences (Switzerland and Italy)

G1. GIUGLIANO, M., Recreating in vivo-like background synaptic activity in in vitro neocortical slices: towards network-clamp, *Proc. Congresso Naz. SINS 2005*, Ischia (I), oral presentation, 2005.

G3. GIUGLIANO, M., LÜSCHER, H.-R. Attività sinaptica spontanea (non-selettiva) *in vivo*-like riprodotta *in vitro* in fettine acute neocorticali, *Proc. Congresso Naz. SINS 2003*, Pisa (I), oral presentation, 2003.

G4. GIUGLIANO, M., ARSIERO, M., DARBON, P., LÜSCHER, H.-R., STREIT, J. La risposta elettrofisiologica di neuroni neocorticali in coltura, ad una stimolazione rumorosa in current-clamp, *Proc. Congresso Naz. SINS 2003*, Pisa (I), 2003.

G5. GIUGLIANO, M., ARSIERO, M., DARBON, P., MARTINOIA, S., LÜSCHER, H.-R., AND STREIT, J. The electrophysiological response of cultured neocortical neurons to *in vivo*-like noisy currents: experimental results and mathematical modelling, *Proc. Joint Meeting of the Swiss Soc. Neurosci. and the Swiss Soc. Psychiatry and Psychotherapy*, Fribourg (CH), 2003.

G6. GIUGLIANO, M. AND LÜSCHER, H.-R. Irregular *in vivo*-like background synaptic activity recreated in *in vitro* neocortical slices, by means of a novel multi-site stimulation paradigm employing substrate microelectrode arrays, *Proc. Joint Meeting of the Swiss Soc. Neurosci. and the Swiss Soc. of Psychiatry and Psychotherapy*, Fribourg (CH), 2003.

G7. GIUGLIANO, M. Substrate microelectrode arrays coupled to *in vitro* networks of neurons: an engineering approach to neuroscience", *Proc. of Congresso Nazionale SINS 2001*, Torino (I), oral presentation, 2001.

G8. GIUGLIANO, M. Functional Interactions between Long-term and Short-term Synaptic Plasticities: Implications for Global Electrophysiological Network Stability and Information Processing Explored by Means of Mathematical Modelling and Computer Simulations, *Proc. of Congresso Nazionale SINS 2001*, Torino (I), 2001.

G9. GIUGLIANO, M. AND GRATTAROLA, M. Sintesi di modelli matematici generali per la simulazione efficiente al calcolatore della dinamica delle conduttanze sinaptiche in reti di neuroni", *Proc. Congresso Giovani Cultori delle Neuroscienze*, Pisa (I), 2000.

G10. BOVE, M., GIUGLIANO, M. AND GRATTAROLA, M. How to measure and model the collective behaviour of networks of neurons: a bioengineering approach to neuroscience, *Proc. of 3o Convegno Nazionale: "Nuove Prospettive in Biostrutture e Biosistemi"*, Venezia (I), 1998.

G11. BOVE, M., GIUGLIANO, M., GRATTAROLA, M., MARTINOIA, S. AND VERRESCHI, G. Towards bio-artificial systems: Networks of neurons coupled to planar arrays of microtransducers, *Proc. of 3rd Italian Conf. Sensors and Microsystems (AISEM)*, (Di Natale, C. and D'Amico, A. eds.), 3-8,World Scientific, Singapore, 1998.

H – Media, Press and Scientific Divulgation (audio/video feeds available at http://www.giugliano.info/pubs.htm)

H1. "Radio 3 Scienza", RAI Radio 3, **Italian State Broadcasting Company**, Dec 21st 2005, "Nanocervelli pret-a-porter" , with Fabio Pagan and Laura Ballerini.

H2. "MTW - Menschen Technik Wissenschaft ", Schweizer Fernsehen DRS (SF1 channel) , **Swiss National Broadcasting Company**, Feb 27th 2003, "Biocomputer".

H3. BOVE, M., GIUGLIANO, M., GRATTAROLA, M., AND MARTINOIA, S. Reti Bioartificiali di Neuroni, ***Le Scienze***, 375:64-70, Italian Edition of ***Scientific American***, 2000.

J – Theses

J1. GIUGLIANO, M. (2001)
Modeling the electrophysiological properties of in vitro neurobiological systems: communication in neuronal networks and collective electrophysiological activity. **PhD Thesis**, Polytechnic of Milan.

J2. GIUGLIANO, M. (1997)
Simulation of the development of a network of neurons regulated by bioelectrochemical activity-dependent processes. **Master Thesis**, University of Genova.

Current scientific interests

I am presently junior group leader at the Laboratory of Neuroscience of Microcircuits of the Brain Mind Institute of Prof. H. Markram. I am supervising a small group of people in the investigation of the properties and the consequences at the single-cell and population-level, of coupling cortical neuronal networks to carbon nanotube (CNTs) conductive culture substrates. There is preliminary evidences that the electrical coupling between cell membrane and CNTs is consisting of a faradaic (resistive – DC) conduction, as opposed to a capacitive conduction (as in analogous extracellular stimulation techniques, employing metallic electrodes). If the coupling proves to be resistive and bidirectional, depositing CNTs on arrays of microelectrodes will realize the first non-invasive high-resolution long-term device for intracellular-like electrophysiological stimulation as well as for recording.

My interests are also focused on the network-level dynamic properties and their emergence from the single-neuron response properties, characterized by cellular electrophysiology. This involves the use of novel experimental protocols inspired by theoretical frameworks, such as the extended mean-field descriptions of networks of spiking model neurons. I am performing and supervising both experimental and theoretical investigations, involving whole-cell patch-clamp recordings in both acute cortical rat brain slices and dissociated cell coltures. The static and dynamic electrical response properties of neurons are investigated under an appropriate framework, which is mimicking the in vivo-like conditions cortical neurons experience in the intact cortex of behaving mammals. Complementing technological tools for such research consist in the coupling of in vitro neuronal networks (i.e. both slices and cell cultures) to arrays of microfabricated microelectrodes (MEAs) for non-invasive extracellular electrical stimulation and long-term recording, combined to whole-cell patch-clamp recording. I have been also devoting some time to the prototypical development of an innovative integrated photo-activation device for selective spatio-temporal uncaging and targeted cell-populations beaching, employing Digital MicroMirrors Devices, the same components at the core of beam projectors.

Detailed overview on the previous scientific experiences

2001 – 2005: I was Postdoctoral fellow at the Institute of Physiology, University of Bern, Switzerland, head by Prof. Hans-Rudolf Lüscher. My main research activity involved combining whole-cell patch-clamp *in vitro* electrophysiology and microelectrode substrate arrays, with the aim of studying and experimentally characterizing network-level cortical electrophysiology. I further focused my efforts to the theoretical study of the collective properties of networks of spiking neurons, using the “statistical mean-field theory", designing novel electrophysiological paradigms. I fully developed the electronic hardware and the acquisition software to perform my electrophysiological experiments and all the analysis tools employed in the research.

1997 – 2001: I worked as a Predoctoral fellow at the Department of Biophysical and Electronic Engineering of the University of Genova, under the supervision of Prof. Massimo Grattarola My research activities and interests included theoretical neurobiology and neuroengineering, the mathematical modeling and computer simulations of short-term and long-term synaptic plasticity phenomena, as well as of the collective electrophysiological activity of *in vitro* network of dissociated neurons, at the biophysical and circuit level.

1999: I was visiting doctoral student at the Laboratoire de physiopathologie des résaeux médullaire, INSERM EPI 9914, Institut de Neuroscience F. Magendie, Bordeaux (France). I studied the cellular basis of nociceptive integration of the spinal cord, and of the relaying of sensory inputs towards supraspinal central nervous system. Under the supervision of Dr. Gwendal LeMasson, I applied the spike-train analysis information theoretical tools, for the analysis of the available experimental neurobiological data.

1999: I was visiting doctoral student at the Biophysics Sector of SISSA, International School for Advanced Studies, Trieste (I), under the supervision of Dr. Andrea Nistri, where I studied the *in vitro* pattern generation of locomotor rhythms of the spinal cord. I assisted in a few experiments of intracellular and extracellular recording of electrophysiological activity of neurons from intact neonatal rat spinal cord explants, focusing on the definition of a mathematical model for the dissecting the cellular and subcellular basis of the so-called "fictive locomotion" and the disinhibited rhythm generation.

1997 –1998: During the period from October 1997 to June 1998, I was visiting student at the Institute of Neuroinformatics, ETH/University of Zürich (CH), working on a "neuromorphic" electronic aVLSI hardware project under the supervision of Prof. Rodney J. Douglas and Dr. Giacomo Indiveri. During my stay, I participated to a few experiment of intracellular and whole-cell patch clamp recordings of the electrical activity of rat hippocampal and cortical acute slices.

1995: I worked at the Cellular Differentiation Laboratory of the Advanced Biotechnology Center, Genova (I), as an undergraduate student, under the supervision of Prof. Ranieri Cancedda and Dr. Ivan Martin. I greatly benefited from such an experience as I gained hands-on experience on digital microscopy and dissociated cell-cultures techniques, tissue engineering (i.e. mesenchimal stem cells culture protocols), and about the effects of exposure to electromagnetic fields on differentiation of stem cells.

References

Prof. Dr. Med. Hans-Rudolf Lüscher
Dean of the Medical Faculty and Director of the Institute of Physiology
University of Bern, Switzerland
Phone: +41 31 631 87 24 Fax: +41 31 631 34 14 Email: luescher@pyl.unibe.ch

Prof. Vincenzo Crunelli
Cardiff School of Biosciences, University of Cardiff, Cardiff, UK
Phone: +44 29 20 874801 Fax: +44 29 20 874116 Email: crunelli@cardiff.ac.uk

Prof. Stefano Fusi
Center for Theoretical Neuroscience, Columbia Univ., School of Medicine, New York, US
and Institute of Neuroinformatics, ETH/University of Zurich, Zurich, Switzerland
Phone: +41 44 635 30 37 Fax.: +41 44 635 30 53 Email fusi@ini.unizh.ch

Prof. Laura Ballerini
Medical Faculty of the University of Trieste, University of Trieste, Trieste, Italy
Phone: +39 040 5587183 Email: ballerin@psico.units.it

Prof. Alain Destexhe
Unité de Neurosciences Intégratives et Computationnelles, CNRS

UPR-2191, Avenue de la Terrasse, Bat. 33, 91198 Gif-sur-Yvette, France
Phone: +33 1 69 823435 Fax: +33 1 69 823427 Email: destexhe@iaf.cnrs-gif.fr

Prof. Sergio Martinoia
Department of Biophysical and Electronic Engineering, University of Genova, Italy
Phone: +39 010 3532251 Email: giaser@dibe.unige.it

Prof. Vincenzo Tagliasco
Department of Communication Computer and System Sciences, University of Genova, Italy
Phone: +39 010 3532817 Email: vincenzo@dist.unige.it