


Curriculum Vitae

Name	Position title
Laura Ballerini 	Full Professor of Physiology International School for Advanced Studies SISSA-ISAS Trieste via Bonomea, 265 - 34136 Trieste ITALY laura.ballerini@sissa.it tel +39 040 3787 779 room 542

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
University of Florence School of Medicine, Italy	MD <i>cum laude</i>	1988	Medicine
University of Florence School of Medicine, Italy	PDF	1988-1992	Electrophysiology
University of Florence School of Medicine, Italy	Specialization <i>cum laude</i>	1992	Neuropharmacology
Full General Medical Council, UK	Registration	1992	Medicine

Laura Ballerini graduated (MD) at the Florence School of Medicine, Università di Firenze, Italy in 1988. She was a Postdoctoral fellow (*Physiology Department*) at UCL (London, UK) from 1991 and later became assistant professor of Physiology at the *Biophysics Sector* of the International School for Advanced Studies (SISSA-ISAS) of Trieste, Italy in 1995. In 2002 Laura Ballerini became associate professor of Physiology at the *Life Science Department*, Università di Trieste, Italy. From 2012 she became full professor of Physiology, at the *Life Science Department*, Università di Trieste, Italy. From December 2013 to Decemebr 2015 she has a joint appointment as full professor of Physiology between the International School for Advanced Studies SISSA-ISAS of Trieste and the University of Trieste. From January 2016 she has an appointment as full professor of physiology at SISSA.

She has been working for several years on the physiology of spinal cord neurons/spinal cord networks and has vast experience in using a variety of experimental electrophysiological techniques and in vitro model systems. Laura Ballerini has provided important contribution to the understanding of spinal network physiology, plasticity and development. In her laboratory she developed and is currently using the organotypic slice cultures from the rat/mouse spinal cord as a model system. Recently, Laura Ballerini has been working on the interactions between living neurons and micro-nano fabricated substrates or bioactive-composite containing carbon nanotubes. The scientific strategy at the core of these activities is the convergence between nanotechnology, chemistry and neurobiology. Such convergence, beyond helping understand the functioning and malfunctioning of the brain, can stimulate further research in this area and may ultimately lead to a new generation of nanomedicine applications in neurology and to new opportunities for the health care industry.

Web pages: <http://loop.frontiersin.org/people/1325/overview>
<http://dsv.units.it/it/ricerca/ambiti/biomedicina?q=it/node/18852>
<http://phdneurobiology.sissa.it/eng/faculty/associated/laura-ballerini.aspx>

B. Positions and Honors

2016-to date	Chair professor of Physiology Neuroscience Area, SISSA Trieste, Italy
2013-2015	joint appointment as Full professor of Physiology SISSA-UnitS, Trieste, Italy
2012-2013	Full Professor of Physiology, Life Science Department University of Trieste, Italy
2010	Winner of the competition for the post of full Professor in Physiology, University of Napoli Parthenope, Italy
2002-2012	Associate professor of Physiology, Life Science Department, University of Trieste, Italy
1995-2002	Assistant professor of Physiology at the Biophysics Sector of the International School for Advances Studies, Trieste, Italy
2000	Winner of the competition for the post of associate professor in Physiology, University of Udine, Italy
1993-1995	Post doctoral fellow, Biophysics Sector, International School for Advances Studies, Trieste
1992-1993	Career break due to a serious road accident
1991-1992	Postdoctoral fellow in the Department of Physiology, University College London, with the support of Welcome Trust

C. Selected invited lectures (last 5 years)

2016	invited lecture Graphene CDT lecture Cambridge UK, July 2016
2016	invito Conferenza Colloquio dei Ghisleri, Pavia, Febbraio 2016
2015	plenary lecture at NIS Colloquium Accademia delle Scienze, Torino, 30 Novembre
2015	symposium organizer and lecturer at the 66th SIF National Congress, Genova, Italy 16-18 September
2015	invited lecture at the "2015 SAVVY Winter School" Les Diablerets, Switzerland February 10-15
2014	invited lecture at La Sapienza, Center for Research in Neurobiology "Daniel Bovet", Rome Italy 7 November
2014	invited speaker at the "International Conference on Diamond and Carbon Materials" Madrid Spain September 7-11
2014	invited speaker at the Mini-symposium "Basic and Translational neurochemistry: glia and neurons in health and disease" Rijeka, Croatia July 7
2014	invited speaker at the 6 th Forum on New Materials - Materials for Neural Interfaces and Implantable Neural Devices Montecatini Italy 16-20 June
2014	invited lecture at the "Engineering the Nanobiointerface" seminar Galway Ireland 3 June
2014	invited speaker at "The future of research & clinical applications in Neuroscience" Genova, Italy April 3-4
2013	Invited seminar at University of Colorado School of Medicine joint Neuroscience Research Seminar Dec 9 2013
2013	Invited lecture at the "Materials for Neural Interfaces" Symposium at the Materials Research Society (MRS) fall meeting Dec 1-6, 2013 Boston (US)
2013	Faculty at the School on Synchrotron Radiation Techniques and Nanotechnology: A Synergic Approach to Life Sciences and Medicine 11-29 November 2013 Stellenbosh, South Africa
2013	Invited lecture at the XV Congress of the Italian Society of Neuroscience, Rome 3-5 October
2013	Invited faculty at the BENEFRI workshop 2013 in Experimental and Clinical Neuroscience January 23 - 25, University of Bern, Physiology Department, Switzerland
2012	EU delegate and invited lecture at the workshop on CONVERGING NANO-BIO-INFO-COGNITIVE S&T FOR RESPONSIBLE INNOVATION AND SOCIETY Research, Governance and Innovation 20 September 2012, IMEC, Leuven Belgium
2011	Invited Keynote lecturer at the 4th IBEC Symposium on Bioengineering and Nanomedicine, Barcelona, Spain
2011	Invited lecture at the international workshop "Neuroprosthetic Approaches to Stimulate Spinal Circuits and Neural Repair" at the Spinal Cord Injury Research Institute at the Hospital Nacional de Paraplégicos, Toledo, Spain
2011	Keynote lecture NanoChannels meeting, ORT Tel Aviv Israel
2010	Organizer and speaker of/at "Frontiers in Neuroengineering The Monte Verità Workshop" Monte Verità, Ascona Organizers: M. Giugliano, H. Markram, L. Ballerini

- 2010 Invited speaker at the symposium “Brain Machine Interfaces - Implications for science, clinical practice and society”, Ystad Saltsjöbad, Sweden.
- 2010 Invited speaker IoN’s conference ‘Nanomedicine: Visions for the Future’ at the NH Amsterdam Centre, Amsterdam.

D. Selected recent peer-reviewed book chapters

- Alessandra Fabbro, Francesca Maria Toma, Giada Cellot, Maurizio Prato and Laura Ballerini (2012) Carbon Nanotubes and Neuronal Performance in **Nanomedicine and the nervous system** edited by Colin R. Martin, Victor R. Preedy and Ross J. Hunter in THE NANO SERIES edited by SCIENCE PUBLISHERS New Hampshire 03748, USA (ISBN 9781578087280)
- M. Giugliano, L. Gambazzi, L. Ballerini, M. Prato, S. Campidelli (2012) Carbon nanotubes as electrical interfaces to neurons, pp 187-207 In **Nanotechnology for Biology and Medicine**, Parpura V and Silva GA, eds., **Springer New York**, New York USA ISBN 978-0-387-31282-8. DOI: 10.1007/978-0-387-31296-5
- Laura Ballerini (2012) Cervello e nanomateriali: ricostruzione o potenziamento neuronale? in “**Il post-umano e l’etica del nuovo. Dal corpo bionico al corpo sintetico**”, edizione Carocci.

E. Research Support

Ongoing Research Support (only as PI)

- NEUROSCAFFOLDS (Laura Ballerini PI) # 604263 European Committee FP7-NMP-2013-EU-China 2013-2016
- GRAPHENE Project full title: "Graphene-Based Revolutions in ICT And Beyond"; Flagship Grant agreement no: 604391 (WP leader Maurizio Prato; Neurobiology Team PI Laura Ballerini) 2013-2016
- PRIN-MIUR 2012 title “Spinal injury: towards the development of cell-instructive scaffolds for nerve tissue repair” n. 2012MYESZW (Ballerini PL and PI) 2014-2017
- GRAPHENE Project full title: "Graphene-Based Revolutions in ICT And Beyond" Flagship grant agreement n. 696656 - GrapheneCore1 (PI Laura Ballerini) 2016-2018

Completed Research Support (only as PI)

- ERC-2008-AdG Proposal No 227135 (Prato PL, Ballerini, co-PI) 2008-2013
European Committee 7th Framework Programme “Ideas”
Team leader of the Neurobiology Unit: “Neuron Networking with Nano Bridges via the Synthesis and Integration of Functionalized Carbon Nanotubes (to the University of Trieste 2.500.000,00 euro)
- FP6-2004-NMP-TI-4 European Committee FP6 (Ballerini, PL and PI) 2006-2009
“Towards new generations of neuro-implantable devices: engineering NEURONs/carbon NANOTubes integrated functional units” (to the University of Trieste 580.000,00 euro)
- PRIN-MIUR Ministry of University and Research (Italy) (Nistri, PL, Ballerini, PI) 2006-2008
“Plasticita’ attivita’ dipendente e lesioni spinali: analisi delle proprieta’ cellulari e sinaptiche espresse dai neuroni spinali dopo danno tissutale secondario in un modello di rete organotipica in vitro” (to the University of Trieste 35.000,00 euro)
- FIRB-MIUR Ministry of University and Research (Italy) (D’Angelo PL, Ballerini PI) 2002-2005
"Spinal micro-circuits in vitro: a functional and structural study of the role of trans-synaptic adhesion molecules in network dynamic during embryonic development" (to the University of Trieste 75.000,00 euro)
- FIRB-MIUR Ministry of University and Research (Italy) (Calissano PL, Ballerini PI) 2002-2005
"Transgenic mouse model of neurodegenerative diseases: further development of in vitro model systems to allow detailed functional studies." (to the University of Trieste 80.000,00 euro)

Grant L.R. 3/98, art. 16. Regione Friuli Venezia Giulia, Italy (Ballerini, PI) 2002-2004
 Finanziamento di Progetti di Ricerca Scientifica e di Iniziative di Divulgazione Scientifica di rilevante interesse per il Friuli-Venezia Giulia Fondo anno 2002: "Sviluppo di reti neuronali funzionalmente integrate con nanotubi di carbonio in vitro" (to SISSA 20.000,00 euro)

TELETHON (grant #1184 to Laura Ballerini PI) 2000-2002
 "An electrophysiological and immunohistochemical study of neurodegeneration mechanisms in amyotrophic lateral sclerosis (ALS) using a novel in vitro model: the organotypic spinal cord culture from transgenic mice expressing a ALS-linked SOD-1 mutation" (to SISSA 120.000,00 euro)

F. Professional Memberships

Society for Neuroscience (SfN, US)

American Society for Neurochemistry (ASN, US)

Biophysical Society (US)

Italian Physiology Society (SIF)

Italian Society of Neuroscience (SINS)

G. Publications (selected from 2005)

1. Viviana Lovat, Davide Pantarotto, Laura Lagostena, Barbara Cacciari, Micaela Grandolfo, Massimo Righi, Giampiero Spalluto, Maurizio Prato and **Laura Ballerini** (2005) Carbon nanotube substrates boost neuronal electrical signalling. *Nanoletters* 5, 1107-1110. DOI: 10.1021/nl050637m
2. F. Furlan, L. Guasti, D. Avossa, A. Becchetti, E. Cilia, **L. Ballerini** and A. Arcangeli (2005) The HERG-current is transiently expressed during development of mouse spinal network in vitro *Neuroscience*, 135 (4); 1179-1192. doi:10.1016/j.neuroscience.2005.06.040
3. D. Avossa, M. Grandolfo, F. Mazzarol, M. Zatta and **L. Ballerini** (2006) Early signs of motoneuron vulnerability in a disease model system: characterization of transverse slice cultures of spinal cord isolated from embryonic ALS mice. *Neuroscience* 138, 1179-1194. doi:10.1016/j.neuroscience.2005.12.009
4. Alessandra Fabbro, Beatrice Pastore, Andrea Nistri and **Laura Ballerini** (2007) Activity-independent intracellular calcium signals are spontaneously generated in ventral spinal neurons during development in vitro *Cell Calcium*, 41:317-329. doi:10.1016/j.ceca.2006.07.006
5. Francesco Furlan, Giuliano Taccola, Micaela Grandolfo, Leonardo Guasti, Annarosa Arcangeli, Andrea Nistri and **Laura Ballerini** (2007) ERG conductance expression modulates the excitability of ventral horn GABAergic interneurons that control rhythmic oscillations in the developing mouse spinal cord *Journal of Neuroscience* 27, 919 -928. doi:10.1523/JNEUROSCI.4035-06.2007
6. Mazzatenta A, Giugliano M, Campielli S, Gambazzi L, Businaro L, Markram H, Prato M and **Ballerini L.** (2007) Interfacing Neurons with Carbon Nanotubes: Electrical Signal Transfer and Synaptic Stimulation in Cultured Brain Circuits *Journal of Neuroscience* 27:6931-6936. doi:10.1523/JNEUROSCI.1051-07.2007
7. Antonietta Sucapane, Giada Cellot, Maurizio Prato, Michele Giugliano, Vladimir Parpura and **Laura Ballerini** (2009) Interactions between cultured neurons and carbon nanotubes: A nanoneuroscience vignette. *Journal of Nanoneuroscience*, 1:10-16. published on-line 2008. DOI: 10.1166/jns.2009.002
8. **Laura Ballerini** (2008). Bridging multiple levels of exploration: towards a neuroengineering-based approach to physiological and pathological problems in neuroscience. *Front. Neurosci.* 2,1 : 24-25. doi: 10.3389/neuro.01.024.2008
9. Michele Giugliano, Maurizio Prato and **Laura Ballerini** (2008) Nanomaterial/neuronal hybrid system for functional recovery of the CNS. *Drug Discov Today: Disease Model*, vol. 5 pp. 37-43. Special Issue on Nervous system disorders doi:10.1016/j.ddmod.2008.07.004
10. Cellot G., Cilia E., Cipollone S., Rancic V., Sucapane A., Giordani S., Gambazzi L., Markram H., Grandolfo M., Scaini D., Gelain G., Casalis L., Prato M., Giugliano M. and **Ballerini L.** (2009)

Carbon nanotubes might improve neuronal performance by favouring electrical shortcuts *Nature Nanotechnology* vol. 4 pp 126-133. doi:10.1038/NNANO.2008.374

11. C. Gaillard, G. Cellot, S. Li, H. Dumortier, G. Spalluto, B. Cacciari, M. Prato, **L. Ballerini**, and A. Bianco (2009) Carbon nanotubes carrying cell adhesion peptides do not interfere with neuronal functionality *Advanced Materials* 21, 1-6. DOI: 10.1002/adma.200900050
12. Sara Sibilla, Alessandra Fabbro, Micaela Grandolfo, Paola D'Andrea, Andrea Nistri and **Laura Ballerini** (2009) The patterns of spontaneous Ca²⁺ signals generated by ventral spinal neurons in vitro show time-dependent refinement. *Eur J Neurosci* 29, 1543-1559. DOI: 10.1111/j.1460-9568.2009.06708.x
13. Sara Sibilla and **Laura Ballerini** (2009) GABAergic and glycinergic interneuron expression during spinal cord development: dynamic interplay between inhibition and excitation in the control of ventral network outputs. *Progress in Neurobiology* 89, 46-60. doi:10.1016/j.pneurobio.2009.06.001
14. Nicholas A. Kotov, Jessica Winter, Isaac P. Clements, Edward Jan, Brian P. Timko, Stephane Campidelli, Smita Pathak, Andrea Mazzatenta, Charles M. Lieber, Maurizio Prato, Ravi V. Bellamkonda, Gabriel A. Silva, Nadine Wong Shi Kam, Fernando Patolsky, and **Laura Ballerini**. *Nanomaterials for Neural Interfaces* (2009) *Advanced Materials* 21, 1-35. DOI: 10.1002/adma.200801984
15. **Laura Ballerini** (2009) Insights into medio-lateral signalling in the developing mouse hindbrain: properties of midline drivers of network activity. *J Physiol* 587.21, p 5007. DOI: 10.1113/jphysiol.2009.181347
16. Giada Cellot, **Laura Ballerini**, Maurizio Prato and Alberto Bianco (2010) Neurons are able to internalize soluble CNT: new opportunities or old risks? *Small* 6:2630-1633.
17. Giada Cellot, Francesca Maria Toma, Zeynep Kasap Varley, Jummi Laishram, Ambra Villari, Mildred Quintana, Sara Cipollone, Maurizio Prato, **Laura Ballerini** (2011) Carbon nanotube scaffolds tune synaptic strength in cultured neural circuits: novel frontiers in nanomaterial-tissue interactions *Journal of Neuroscience* 31, 12945-12953 doi:10.1523/JNEUROSCI.1332-11.2011
18. Alessandra Fabbro, Giada Cellot, Maurizio Prato and **Laura Ballerini** (2011) Interfacing Neurons with Carbon Nanotubes: (re)engineering neuronal signalling *Progress in Brain Research in Brain Machine Interfaces - Implications for Science, Clinical Practice and Society* edited by Jens Schouenberg, Martin Garwicz and Nils Danielsen; vol 194, pp231-241. DOI: 10.1016/B978-0-444-53815-4.00003-0
19. **Laura Ballerini** (2011) Cervello e nanomateriali: ricostruzione o potenziamento neuronale? in "Il post-umano e l'etica del nuovo. Dal corpo bionico al corpo sintetico", edizione Carocci.
20. M. Giugliano, L. Gambazzi, **L. Ballerini**, M. Prato, S. Campidelli (2012) Carbon nanotubes as electrical interfaces to neurons, pp 187-207 In *Nanotechnology for Biology and Medicine*, Parpura V and Silva GA, eds., Springer New York, New York USA ISBN 978-0-387-31282-8. DOI: 10.1007/978-0-387-31296-5
21. Alessandra Fabbro, Francesca Maria Toma, Giada Cellot, Maurizio Prato and **Laura Ballerini** (2012) Carbon Nanotubes and Neuronal Performance in *Nanomedicine and the nervous system* edited by Colin R. Martin, Victor R. Preedy and Ross J. Hunter in THE NANO SERIES edited by SCIENCE PUBLISHERS New Hampshire 03748, USA (ISBN 9781578087280)
22. Alessandra Fabbro, Ambra Villari, Jummi Laishram, Denis Scaini, Francesca M.Toma, Antonio Turco, Maurizio Prato and **Laura Ballerini** (2012) Spinal cord explants use carbon nanotube interfaces to enhance neurite outgrowth and to fortify synaptic inputs *ACS Nano* 6, 2041-2055 DOI: 10.1021/nn203519r
23. Valentina Martinelli, Giada Cellot, Francesca Maria Toma, Carlin Long, John Caldwell, Lorena Zentilin, Mauro Giacca, Antonio Turco, Maurizio Prato, **Laura Ballerini**, Luisa Mestroni (2012) Carbon nanotubes promote growth and spontaneous electrical activity in cultured cardiac myocytes *NanoLetters* 12, 1831-1838.
24. Alessandra Fabbro, Susanna Bosi, **Laura Ballerini**, Maurizio Prato (2012) Carbon Nanotubes: Artificial Nanomaterials to Engineer Single Neurons and Neuronal Networks *ACS Chemical Neuroscience* 3, 611-618.
25. Susanna Bosi, Alessandra Fabbro, **Laura Ballerini**, Maurizio Prato (2013) Carbon nanotubes: a promise for nerve tissue engineering? *Nanotechnology Reviews* 2(1): 47-57.
26. Valentina Martinelli, Giada Cellot, Francesca Maria Toma, Carlin S. Long, John H. Caldwell, Lorena Zentilin, Mauro Giacca, Antonio Turco, Maurizio Prato, **Laura Ballerini**, Luisa Mestroni (2013) Carbon nanotubes instruct physiological growth and functionally mature syncytia: non-genetic engineering of neonatal cardiac myocytes. *ACS Nano* 7: 5746-5756.

27. Valentina Martinelli, Giada Cellot, Alessandra Fabbro, Susanna Bosi, Luisa Mestroni and
28. **Laura Ballerini** (2013) Improving cardiac myocytes performance by carbon nanotubes platforms. *Frontiers in Physiology* 4: 1-6.
29. Alessandra Fabbro, Maurizio Prato and Laura Ballerini (2013) Carbon nanotubes in neuroregeneration and repair. *Advanced Drug Delivery Reviews* within the Carbon Nanotubes in Medicine & Biology - issue <http://dx.doi.org/10.1016/j.addr.2013.07.002>
30. Aldinucci A, Turco A, Biagioli T, Toma FM, Bani D, Guasti D, Manuelli C, Rizzetto L, Cavalieri D, Massacesi L, Mello T, Scaini D, Bianco A, Ballerini L, Prato M, Ballerini C. (2013) Carbon nanotube scaffolds instruct human dendritic cells: modulating immune responses by contacts at the nanoscale. *NanoLetters* 13, 6098-105.
31. Fabbro A, Sucapane A, Toma FM, Calura E, Rizzetto L, Carrieri C, Roncaglia P, Martinelli V, Scaini D, Masten L, Turco A, Gustincich S, Prato M, **Ballerini L**. (2013) Adhesion to carbon nanotube conductive scaffolds forces action-potential appearance in immature rat spinal neurons. *PLoS One*. 8,e73621.
32. Nguyen DT, Barham W, Zheng L, Shillinglaw B, Tzou WS, Neltner B, Mestroni L, Bosi S, **Ballerini L**, Prato M, Sauer WH. (2014) Carbon Nanotube Facilitation of Myocardial Ablation with Radiofrequency Energy. *J Cardiovasc Electrophysiol*. Aug 5. doi: 10.1111/jce.12509.
33. Wick P, Louw-Gaume AE, Kucki M, Krug HF, Kostarelos K, Fadeel B, Dawson KA, Salvati A, Vázquez E, **Ballerini L**, Tretiach M, Benfenati F, Flahaut E, Gauthier L, Prato M, Bianco A. (2014) Classification framework for graphene-based materials. *Angew Chem Int Ed Engl*. 53, 7714-8.
34. Bosi S, Rauti R, Laishram J, Turco A, Lonardoni D, Nieus T, Prato M, Scaini D, Ballerini L. From 2D to 3D: novel nanostructured scaffolds to investigate signalling in reconstructed neuronal networks. *Scientific Reports* 2015 5:9562.
35. Ferrari AC, Bonaccorso F, Falko V, Novoselov KS, et al. Science and technology roadmap for graphene, related two-dimensional crystals, and hybrid systems. *Nanoscale* 2015 7(11):4598-810.
36. Susanna Bosi, Alessandra Fabbro, Cristina Cantarutti, Marko Mihajlovic, Laura Ballerini* and Maurizio Prato*. Carbon Based Substrates for Interfacing Neurons: Comparing Pristine with Functionalized Carbon Nanotubes Effects on Cultured Neuronal Networks. *CARBON* (2016) 97;87-91 published online 2015 doi: <http://dx.doi.org/10.1016/j.carbon.2015.07.074>
37. Susanna Bosi, Alessandra Fabbro, Cristina Cantarutti, Marko Mihajlovic, Laura Ballerini* and Maurizio Prato* (2015) Carbon Based Substrates for Interfacing Neurons: Comparing Pristine with Functionalized Carbon Nanotubes Effects on Cultured Neuronal Networks. *CARBON* 97; 87-91 published online doi: <http://dx.doi.org/10.1016/j.carbon.2015.07.074>
38. Alessandra Fabbro, Denis Scaini, Verónica León, Ester Vázquez *, Giada Cellot, Giulia Privitera, Lucia Lombardi, Flavia Tomarchio, Francesco Bonaccorso, Susanna Bosi, Andrea C. Ferrari*, Laura Ballerini* and Maurizio Prato* (2015) Graphene-based interfaces do not alter target nerve cells. *ACS Nano* Publication Date (Web): December, 2015 (Article) DOI: 10.1021/acsnano.5b05647
39. G. Cellot, P. Lagonegro, G. Tarabella, D. Scaini, F. Fabbri, S. Iannotta, M. Prato, G. Salvati* and L. Ballerini* (2015) PEDOT:PSS interfaces support the development of neuronal synaptic networks with reduced neuroglia response in vitro. *Frontiers in Neural Technology* (2015) *Front. Neurosci.* doi: 10.3389/fnins.2015.00521