



PAOLO RAVAZZANI

CURRICULUM VITAE

PERSONAL INFORMATION

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WORK EXPERIENCE

Director of the Istituto di Elettronica e di Ingegneria dell'Informazione e delle Telecomunicazioni IEIIT of Consiglio Nazionale delle Ricerche (2018 -)
Director of Research of Consiglio Nazionale delle Ricerche (2007 -)
Senior Researcher of Consiglio Nazionale delle Ricerche (2001 - 2006)
Researcher of Consiglio Nazionale delle Ricerche (1996 – 2001)

SCIENTIFIC INTERESTS

Paolo Ravazzani (degree in Electronic Engineering and PhD in Bioengineering at the Politecnico di Milano), since the beginning of his career, has characterized his skills and scientific interests in the field of bioengineering. In detail, its activities have mainly focused on the study and development of applications of electromagnetic fields in medicine and health, transferring typical competences of information engineering, with particular reference to computational electromagnetic techniques. His interests have gradually focused on specific applications, such as invasive and non-invasive electromagnetic stimulation of the central and peripheral nervous system, in which he has contributed to the optimization and development of magnetic stimulation technologies and systems, with particular reference to focusing and controlling the electric fields induced in brain tissues. It also focused on aspects related to the evaluation of potential health risk effects due to exposure to electromagnetic fields (non-ionizing radiation) at all frequencies, from static fields to microwaves, with particular reference to the evaluation of the exposure e, acquiring a significant scientific position at European and international level, and coordinating some important multi-center projects of the European Commission and other international organizations.

MAIN COORDINATION AND PARTICIPATION TO RESEARCH PROJECTS

ELFSTAT In-depth evaluation of children's exposure to ELF (40-800 Hz) magnetic fields and implications for health risk of new technologies, ANSES Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail ANSES. The French National Research Program for Environmental and Occupational Health of ANSES 2015/1/202 (2015-2019) – *Scientific Coordinator*

EFHRAN European Health Risk Assessment Network on EMF Exposure, European Commission, Executive Agency for Health and Consumers (EAHC), Health Programme 2008-2013 Framework Agreement Number 20081106 (2009-2012) – *Scientific Coordinator*

EMF-NET Effects of the Exposure to Electromagnetic Fields: from Science to Public Health and Safer Workplace, European Commission FP6 Coordination Action, Thematic Priority 8, Policy support and anticipating scientific and technological needs, Contract N° SSPE-CT-2004-502173 (2004-2008) – *Scientific Coordinator*

EMFnEAR Exposure at UMTS Electromagnetic Fields: Study on Potential Adverse Effects on Hearing, European Commission, DG Health and Consumer Protection, Public Health and Risk Assessment, Work Plan 2004, Commission decision 25 February 2004 2004/192/EC (2004-2007) – *Scientific Coordinator*

GUARD Potential Adverse Effects of GSM Cellular Phones on Hearing, European Commission FP5, Quality of Life and Management of Living Resources, Contract N° QLK4-2001-00150 (2002-2004) – *Scientific Coordinator*

AMPERE Advanced MaPing for the residential ExposuRE to Rf- Emf sources, ANSES Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail ANSES. The French National Research Program for Environmental and Occupational Health of ANSES 2015/1/202 (2016-2020)

CUPIDO Cardio Ultraefficient nanoParticles for Inhalation of Drug prOducts, European Commission, H2020 Call for Nanotechnologies, Advanced Materials, Biotechnology and Production, Topic NMBP-10-2016, GA: 720834 (2017-2021)

GERONIMO Generalised EMF Research using Novel Methods. An integrated approach: from research to risk assessment and support to risk management, European Commission – FP7 Theme [ENV.2013.6.4-2] [Closing gaps of knowledge and reducing exposure to electromagnetic fields (EMF)], Grant Agreement Number 603794 (2014-2018)

ARIMMORA Advanced Research on Interaction Mechanisms of electroMagnetic exposures with Organisms for Risk Assessment, European Commission – FP7 Grant Agreement Number 282891 (2011-2015)

RISK ASSETs Risk Assessment and Management – European Training Programme, European Commission - Executive Agency for Health and Consumers (EAHC) - AGREEMENT NUMBER 20081103 (2009-2011)

MAIN PARTICIPATION TO SCIENTIFIC AND TECHNICAL COMMITTEES AND WORKING GROUPS

WHO International Advisory Committee, WHO World Health Organization EMF Project. Membro dell'International Advisory Committee (2004 -)

Captechs National Representative CapTech Governmental Expert (CGE) at European Defense Agency (EDA) for CapTech CBRN Protection and Human Factors (ESM 04 CBRN & HF), appointed by the Italian Ministry of Defense (2018 -)

CENELEC TC106 Working Group 15: EMF assessment with respect to active implantable medical devices in electric, magnetic and electromagnetic fields. CNR Representative appointed by Comitato CEI 62A from 2006 to 2013. Appointed by Comitato CEI CT106 since 2014 (2006 -)

ICES IEEE International Committee on Electromagnetic Safety ICES. Member of subcommittees "Safety Levels of human exposure" TC95-SC3 0-3 kHz and TC95-SC4 3kHz – 300 GHz (2005 -)

European Bioelectromagnetics Association EBEA. Elected Member of the EBEA Council (2009-2013)

CEI Comitato Elettrotecnico Italiano Comitato Tecnico CT62 Electrical equipment in medical practice; subcommittees 62A; 62B; 62D. CT106 Electromagnetic fields in the human environment. Member appointed by CNR since 2001 (CT106 since 2014). President of the Subcommittee CT62A since July 2016

ACART IEC Advisory Committee on Applications of Robot Technology. Member appointed by CEI (2015-2017)

Politecnico di Milan, PhD School, Teaching Board of the PhD Program in Bioengineering, PhD School of Politecnico di Milano. Member of the PhD Board since 2001 and vice-Chair since 2015.

Board of the GNB National Bioengineering Group. Elected member as representative of the researchers belonging to research institutes (2004-2010)

ICEMB Centro Interuniversitario per lo Studio delle Interazioni fra i Campi Elettromagnetici ed i Biosistemi, Member of the Scientific Committee since 2000

MAIN RESPONSIBILITIES AT CNR

Coordinator of the Milan Unit of CNR IEIIT (2016 -)

Coordinator of the Milan Unit of CNR ISIB (2002 – 2009)

Coordinator of the CNR DIITET Healthcare and Wellbeing Project Area, together with Franca Del Mastro and Massimo Esposito (2018 -)

Coordinator of the CNR Research Project ISIB ME.P06.021 Neuroengineering and communication disorders (2007 - 2013)

Coordinator of the CNR Research Project ISIB ME.P06.014 Analysis of signals and systems (2005 - 2006)

Member of the CNR ISIB Institute Committee (as Coordinator of the Milan Unit) (2002 - 2008)

Member of the CNR CIB Scientific Council (Secretary) (1998 - 2001)

SCIENTIFIC PUBLICATIONS

Paolo Ravazzani is the author at August 24, 2019 of 179 scientific products indexed in Elsevier Scopus with h-index of 25.

Below is a list of scientific papers published from 2016 to 2019 indexed on SCOPUS.

PEER REVIEWED PAPERS ON SCIENTIFIC JOURNAL 2016-2019

Tognola, G., Bonato, M., Chiaramello, E., Magne, I., Souques, M., Parazzini, M., Ravazzani, P.: Use of machine learning in the analysis of indoor ELF MF exposure in children, *International Journal of Environmental Research and Public Health*, 16(7),1230, 2019.

Chiaramello, E., Bonato, M., Fiocchi, S., Tognola G., Parazzini M., Ravazzani, P., Wiart, J.: Radio frequency electromagnetic fields exposure assessment in indoor environments: A review. *International Journal of Environmental Research and Public Health*, 16(6),955, 2019.

Chiaramello, E., Parazzini, M., Fiocchi, S., Bonato M., Ravazzani, P., Wiart, J.: Children exposure to femtocell in indoor environments estimated by sparse low-rank tensor approximations. *Annales des Telecommunications/Annals of Telecommunications*. 74(1-2), pp. 113-121, 2019.

Chiaramello, E., Le Brusquet, L., Parazzini, M., Fiocchi S., Bonato, M., Ravazzani, P.: 3D space-dependent models for stochastic dosimetry applied to exposure to low frequency magnetic fields, *Bioelectromagnetics* (Article in press)

Fiocchi, S., Chiaramello, E., Luzi, L., Ferrulli, A., Bonato, M., Roth, Y., Zangen, A., Ravazzani, P., Parazzini, M.: Deep transcranial magnetic stimulation for the addiction treatment: Electric field distribution modeling, *IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology*, 2(4),8485390, pp. 242-248, 2018.

Bonato, M., Parazzini, M., Chiaramello, E., Fiocchi, S., Le Brusquet, L., Magne, I., Souques, M., Rösli, M., Ravazzani, P.: Characterization of children's exposure to extremely low frequency magnetic fields by stochastic modeling. *International Journal of Environmental Research and Public Health*, 15(9),1963, 2018.

Chiaramello E., Parazzini M., Fiocchi S., Ravazzani P. and Wiart J., Stochastic Dosimetry based on Low Rank Tensor Approximations for the Assessment of Children Exposure to WLAN Source. *IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology*, 2(2): pp. 131-137, 2018.

Fiocchi S., Chiaramello E., Ravazzani P., Parazzini M.: Modelling of the Current Density Distributions during Cortical Electric Stimulation for Neuropathic Pain treatment, *Computational and Mathematical Methods in Medicine*, Article number 1056132, 2018,

Fiocchi S., Chiaramello E., Parazzini M., Ravazzani P.: Influence of tissue conductivity on foetal exposure to extremely low frequency magnetic fields at 50 Hz using stochastic dosimetry. *PLoS ONE* 13(2): e0192131, 2018.

Chiaromello E, Parazzini M, Fiocchi S, Ravazzani P and Wiart J Assessment of fetal exposure to 4G LTE tablet in realistic scenarios: effect of position, gestational age and frequency, *IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology* 1(1): pp. 26-33, 2017.

Chiaromello E., Fiocchi S., Ravazzani P. and Parazzini M.: Stochastic Dosimetry for the Assessment of Children Exposure to Uniform 50 Hz Magnetic Field with Uncertain Orientation. *BioMed Research International*, Article Number 4672124, doi.org/10.1155/2017/4672124, 2017.

Parazzini M., Fiocchi S., Chiaromello E., Roth Y., Zangen A., Ravazzani P.: Electric Field Estimation of Deep Transcranial Magnetic Stimulation Clinically Used for the Treatment of Neuropsychiatric Disorders in Anatomical head Models, *Medical Eng. Physics*, 43, pp. 30-38, 2017.

Fiocchi S., Roth, Y., Zangen, A., Ravazzani, P., Parazzini: Assessment of the electric field induced by deep transcranial magnetic stimulation in the elderly using H-coil, *Applied Computational Electromagnetics Society Journal*, Vol. 31(6), pp. 636-643, 2016.

Gajsek P., Ravazzani P., Grellier J., Samaras T., Bakos J., Thuroczy G.: Review of studies concerning electromagnetic field (EMF) exposure assessment in Europe: Low frequency fields (50 Hz-100 kHz), *International Journal of Environmental Research and Public Health*, 13(9), Article number 875, 2016

Manoli Z., Parazzini M., Ravazzani P., Samaras T.: The electric field distributions in anatomical head models during transcranial Direct Current Stimulation for post-stroke rehabilitation. *Medical Physics*, 44(1), pp. 262-271, 2017.

Fiocchi S., Ravazzani P., Priori A., Parazzini M.: Cerebellar and Spinal Direct Current Stimulation in Children: Computational Modeling of the Induced Electric Field. *Frontiers in Human Neuroscience*, 10:522, 2016. doi: 10.3389/fnhum.2016.00522

Parazzini M., Fiocchi S., Cancelli A., Cottone C., Liorni I., Ravazzani P., Tecchio F.: A Computational Model of the Electric Field Distribution due to Regional Personalized or Non-Personalized Electrodes to Select Transcranial Electric Stimulation Target, *IEEE Trans Biomed Eng.*, 64(1), pp. 184-195, doi: 10.1109/TBME.2016.2553177, 2017.

Liorni I., Parazzini M., Varsier N., Hadjem A., Ravazzani P., Wiart J.: Exposure assessment of one-year-old child to 3G tablet in uplink mode and to 3G femtocell in downlink mode using polynomial chaos decomposition, *Phys. Med. Biol.*, 61, pp. 3237-3257, 2016.

Schüz J., Dasenbrock C., Ravazzani P., Rösli M., Schär P., Bounds P.L., Erdmann F., Borkhardt A., Cobaleda C., Fedrowitz M., Hamnerius Y., Sanchez-Garcia I., Seger R., Schmiegelow K., Ziegelberger G., Capstick M., Manser M., Müller M., Schmid C.D., Schürmann D., Struchen B., Kuster N.: Extremely Low-Frequency Magnetic Fields and Risk of Childhood Leukemia: A Risk Assessment by the ARIMMORA Consortium, *Bioelectromagnetics*, 37: pp. 183-189, 2016.

Guadagnin, V.; Parazzini, M.; Fiocchi, S.; Liorni, I.; Ravazzani, P., "Deep Transcranial Magnetic Stimulation: Modeling of Different Coil Configurations," in, *IEEE Transactions on Biomedical Engineering*, 63(7), pp. 1543-1550, 2016.

Struchen B., Liorni I., Parazzini M., Gängler S., Ravazzani P., Rösli M.: Analysis of personal and bedroom exposure to ELF-MFs in children in Italy and Switzerland, *Journal of Exposure Science & Environmental Epidemiology*, 26(6), pp. 586-596, 2016.

Liorni I., Parazzini M., Struchen B., Fiocchi S., Rösli M., Ravazzani P.: Children's personal exposure measurements to extremely low frequency magnetic fields in Italy, *Int. J. Env. Res. Pub Health*, Volume 13(6), Article number 549, 2016

Liorni I., Parazzini M., Fiocchi S., Douglas M., Capstick M., Kuster N., Ravazzani P.: Computational Assessment of Pregnant Woman Models Exposed to Uniform ELF-Magnetic Fields: Compliance with the European Current Exposure Regulations for the General Public and Occupational Exposures at 50 Hz, *Radiation Protection Dosimetry*, 172(4), pp. 382-392, 2016.

Fiocchi S., Longhi M., Ravazzani P., Roth Y., Zangen A., Parazzini M.: Modelling of the Electric Field Distribution in Deep Transcranial Magnetic Stimulation in the Adolescence, in the Adulthood, and in the Old Age. *Computational and Mathematical Methods in Medicine*, Volume 2016, Article number 9039613, 2016.

Milano, 24 agosto 2019

Ing. Paolo Ravazzani

