



***Pasquale Arpaia** received his B.S. and Ph.D. degrees in Electrical Engineering from the University of Naples Federico II, where he is a full professor of Measurement. He is director of the Interdepartmental Center for Research on Health Management and Innovation (CIRMIS), Head of the Laboratory of Instrumentation and Measurement for Particle Accelerators (IMPALab), the Augmented Reality Laboratory for Health Monitoring (ARHeMlab), the Unina Hi-Tech Academic FabLab, and chairman of the University Federico II Internship Project. He is a Team Leader at the European Organization for Nuclear Research (CERN). He has also been a professor at the University of Sannio, and an associate at the CNR Institutes of Engines and Biomedical Engineering, and now of the INFN Section in Naples and CNR STIIMA. He is*

Associate Editor of the Institute of Physics Journal of Instrumentation, MDPI Instruments and also previously of the Elsevier Journal Computer Standards & Interfaces, IEEE Transactions on Electronics Packaging and Manufacturing. He was editor at Momentum Press of the book collection "Emerging Technologies in Measurements, Instrumentation, and Sensors." In recent years, he has been scientific manager of more than 30 competitive research projects in collaboration with industry, with related international patents and licenses, and has founded 4 academic spin-off companies. He has served as a scientific evaluator in several international research committees. He is general chair of XR Salento, IEEE IWIS and IEEE MetroXRINE. He is an annual plenary speaker at several international scientific conferences. He has published 6 books, and about 350 scientific papers in journals (7 in the last 7 years in Nature Group) and proceedings of national and international conferences. His PhD students were awarded in 2006, 2010 and 2020 at IEEE I2MTC, as well as in 2016 and 2012, 2018 at IMEKO Conference. His book on Brain Computer Interfaces was awarded by CRC Press as the best STEM book in 2024.

Title: EIS-based health micro-instrumentation for measurement of drug transdermal delivery

Abstract: Topical and transdermal drugs are employed with the twofold objectives of minimizing the systemic uptake and concentrating the action at the site within the skin. Topical administration and transdermal delivery are advantageous in comparison with systemic administration routes because complications as first-pass metabolism, toxicity, and side effects are attenuated for the patient. This lecture starts with a background on Electrochemical Impedance Spectroscopy and a state of the art of previous experience of the Lecturer on diagnostics of prosthesis osseointegration for dentistry and audiology. Then, a unified framework is presented for measuring the amount of a substance delivered in a tissue through an impedance variation. Measurement of impedance variation normalized to pre-delivered value is proven to be suitable for assessing the amount of drug penetrated into the skin after transdermal delivery treatment in vivo application. Applications to aesthetics medicine and diabetology are reported: (i) laboratory tests of emulsion on eggplants, (ii) ex-vivo tests on pig ears, and (iii) in-vivo tests on human volunteers. The Lecture is complemented by an insight into the related micro-instrumentation and the model definition by Artificial Intelligence.