

Curriculum vitae di Alessandro Ferreri

Sottosettori ERC primari (max 3): PE7_2, PE7_7

Eventuali sottosettori ERC secondari (max 3):

PERSONAL DETAILS

Family name, First name: Ferrero, Alessandro

Birthdate: December 9, 1954

Researcher unique identifier(s) ORCID: 0000-0002-6760-2925

URL for web site: <https://www.deib.polimi.it/eng/people/details/60662>

• Education and key qualifications

1978 Master in Electrical Engineering
Engineering Faculty, Politecnico di Milano, Italy

• Current position(s)

1994 – Present Full Professor of Electric and Electronic Measurement
Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, Italy

• Previous position(s)

1991 – 1994 Associate Professor of Electric and Electronic Measurement
Dipartimento di Elettrotecnica, Politecnico di Milano, Italy
1987 – 1991 Associate Professor of Electric and Electronic Measurement
Istituto di Elettrotecnica ed Elettronica, University of Catania, Italy
1983 – 1987 Assistant Professor of Electric and Electronic Measurement
Dipartimento di Elettrotecnica, Politecnico di Milano, Italy
1980 – 1983 Designer
Daco System Divisione, Landis & Gyr, Italy

Le seguenti sezioni devono avere lunghezza totale compresa fra 2 e 4 pagine.

RESEARCH ACHIEVEMENTS AND PEER RECOGNITION

Research achievements

[1] G D'Antona, A Ferrero, *Digital signal processing for measurement systems: theory and applications*, Springer, 2006

[2] A. Ferrero and R. Ottoboni, "High-accuracy Fourier analysis based on synchronous sampling techniques," in *IEEE Transactions on Instrumentation and Measurement*, vol. 41, no. 6, pp. 780-785, 1992, doi: 10.1109/19.199406

[3] A. Ferrero, S. Salicone and S. Toscani, "A Fast, Simplified Frequency-Domain Interpolation Method for the Evaluation of the Frequency and Amplitude of Spectral Components," in *IEEE Transactions on Instrumentation and Measurement*, vol. 60, no. 5, pp. 1579-1587, 2011, doi: 10.1109/TIM.2010.2090051.

[4] A. Ferrero and G. Superti-Furga, "A new approach to the definition of power components in three-phase systems under nonsinusoidal conditions," in *IEEE Transactions on Instrumentation and Measurement*, vol. 40, no. 3, pp. 568-577, 1991, doi: 10.1109/19.87021

[5] L. Cristaldi, A. Ferrero and S. Salicone, "A distributed system for electric power quality measurement," in *IEEE Transactions on Instrumentation and Measurement*, vol. 51, no. 4, pp. 776-781, 2002, doi: 10.1109/TIM.2002.803300.

Alessandro Ferrero has pioneered methods, based on advanced Digital Signal Processing techniques, for material and component characterization and power and energy metering. In Europe, he has led in the use of

Virtual Instruments. The measurement and instrumentation technologies he developed have been used to solve complex measurement problems in electric power systems under non-sinusoidal conditions by factoring in Virtual Instruments, Digital Signal Processing and Distributed Measurement Systems. His book [1] has become a reference book on Digital Signal Processing applied to measurement and his paper [4], with over 200 citations, is one of the landmark papers on electric power definition and measurement under non sinusoidal conditions.

- [6] A. Ferrero and S. Salicone, "Measurement uncertainty," in *IEEE Instrumentation & Measurement Magazine*, vol. 9, no. 3, pp. 44-51, 2006, doi: 10.1109/MIM.2006.1637979.
- [7] S. Shirmohammadi and A. Ferrero, "Camera as the instrument: the rising trend of vision based measurement," in *IEEE Instrumentation & Measurement Magazine*, vol. 17, no. 3, pp. 41-47, 2014, doi: 10.1109/MIM.2014.6825388.
- [8] A. Ferrero and S. Salicone, "The random-fuzzy variables: a new approach to the expression of uncertainty in measurement," in *IEEE Transactions on Instrumentation and Measurement*, vol. 53, no. 5, pp. 1370-1377, 2004, doi: 10.1109/TIM.2004.831506
- [9] A. Ferrero and S. Salicone, "Uncertainty: Only One Mathematical Approach to Its Evaluation and Expression?," in *IEEE Transactions on Instrumentation and Measurement*, vol. 61, no. 8, pp. 2167-2178, Aug. 2012, doi: 10.1109/TIM.2012.2193698
- [10] C. Dubois, L. Leblond, J. -M. Pou and A. Ferrero, "Covariance evaluation by means of uncertainty assessment," in *IEEE Instrumentation & Measurement Magazine*, vol. 19, no. 6, pp. 12-18, 2016, doi: 10.1109/MIM.2016.7777646.

Alessandro Ferrero is also an expert in measurement uncertainty evaluation. His tutorials [6, 7] on this topic are among the most cited papers in the field. He has also studied innovative methods [8, 9], based on the mathematical theory of evidence, to express uncertainty in measurement in more general way than that considered by the present Standards. The method for evaluating covariance for uncertainty components he proposed [7] has been considered by the European Standard EN 17507:2021 on Road vehicles – Portable Emission Measuring Systems (PEMS) – Performance assessment.

- [11] A. Ferrero, V. Scotti, *Forensic Metrology. An Introduction to the Fundamentals of Metrology for Judges, Lawyers and Forensic Scientists*, Springer, 2022.
- [12] A. Ferrero and V. Scotti, "Forensic metrology: a new application field for measurement experts across techniques and ethics," in *IEEE Instrumentation & Measurement Magazine*, vol. 16, no. 1, pp. 14-17, 2013, doi: 10.1109/MIM.2013.6417051.
- [13] A. Ferrero, "DNA profiling: A metrological and signal processing perspective," in *IEEE Instrumentation & Measurement Magazine*, vol. 20, no. 1, pp. 4-7, 2017, doi: 10.1109/MIM.2017.7864541.
- [14] A. Ferrero and V. Scotti, "A Metrological Approach to Ethical and Legal Issues in Artificial Intelligence," *2023 IEEE International Conference on Metrology for eXtended Reality, Artificial Intelligence and Neural Engineering (MetroXRINE)*, Milano, Italy, 2023, pp. 555-559, doi: 10.1109/MetroXRINE58569.2023.10405746.

More recently, Alessandro Ferrero has started to study the application of metrology in the forensic field. This multidisciplinary research resulted in a recent book on Forensic metrology [11], one of the only two books published on this topic up to now.

Up to now, Alessandro Ferrero has published 182 papers on international peer-reviewed journals and has received a total of 4110 citations, with an *h*-index of 33 (SCOPUS data). He is in the top 2% scientists, in the Electrical and Electronic Engineering field in the ranking generated by the University of Stanford.

Peer recognition

- Life Fellow of the IEEE
- Fellow of the American Academy of Forensic Sciences (AAFS)
- President of the IEEE Instrumentation and Measurement Society in 2008 and 2009
- Editor-in-Chief of the IEEE Transactions on Instrumentation and Measurement from 2012 to 2016
- In 2006 he received the IEEE Joseph F. Keithley Technical Field Award in Instrumentation and Measurement, with the motivation: "For advancing the measurement of electrical quantities in electric power systems under non-sinusoidal conditions."

- In 2011 he has been elected Foreign Member of the of the Class of Technical Sciences of the Royal Flemish Academy of Belgium for Science and the Arts.
- In 2014 he received the title of Doctor Honoris Causa by the Polytechnic University of Bucharest, Romania
- In 2014 he received the IEEE Instrumentation and Measurement Society Distinguished Service Award
- In 2024 he received the IEEE Instrumentation and Measurement Society Career Excellence Award for “His exceptional career achievements in the Instrumentation and Measurement field and his outstanding leadership and mentorship qualities”

ADDITIONAL INFORMATION

Other contributions to the research community

Alessandro Ferrero has always been an active member of the research community in the field of instrumentation and measurement. He was one of the founding members of the “Associazione Italiana Gruppo di Misure Elettriche ed Elettroniche (GMEE)”, that he chaired from 2004 to 2007. He was among the promoter of the journal “Tutto_Misure”, founded in 2009 and whose editorial board he has chaired since 2018.

Alessandro Ferrero has also been active inside the IEEE Instrumentation and Measurement Society since 1998, holding several positions in the government body of the Society, including the President position for the two-years term 2008-2009.

Alessandro Ferrero is also a registered engineer in Milan, and he is a member of the Committee on Forensic Engineering and the Committee of Metrology of the Milan Order of Engineers.