

# IEEE ICHQP 2022 – Programme Schedule at Glance

## Sunday May 29

14:00	REGISTRATION
	Room A
14:30-16:00	<b>Tutorial 1</b> Interharmonics: What are the Causes, How to Measure Them and Why Do We Care?
16:00-16:30	<b>Coffee Break</b>
16:30-18:00	<b>Tutorial 2</b> Recent findings on EMC issues related to the harmonic behavior of modern power electronic devices
18:30-20:00	<b>Welcome reception</b>

## Monday May 30

08:00-08:30	REGISTRATION
	Room AM
08:30-10:00	<b>Opening Session</b> Keynote Speeches
10:00-10:30	<b>Coffee Break</b>
10:30-12:00	<b>Panel Session 1</b> The Points of View of TSOs and DSOs on the Effects of Energy Transition on Power Quality: Trends, Challenges and Costs
12:05-12:30	<b>Special Meeting with Industries</b>
12:30-13:45	<b>Lunch</b>
13:45-15:15	<b>Panel Session 2</b> From planning to operation: Evaluating the emission of disturbing customer installations
	Room AM
	Room A
	Room B
15:20-16:50	<b>Special Session 1</b> Lightning and Lightning-induced Effects on Power Lines
	<b>Technical Session 1</b> Distributed Energy Resources
	<b>Technical Session 2</b> Data Analytics, Monitoring and Measurements
16:50-20:00	<b>Tour visit</b>

## Tuesday May 31

	Room AM	Room A	Room B	Room V
08:30-10:00	<b>Technical Session 3</b> Disturbance identification and mitigation techniques	<b>Technical Session 4</b> Distortion from 2 to 150 kHz	<b>Technical Session 5</b> Renewable Energy Sources 1	-
10:00-10:30	<b>Coffee Break</b>			
10:30-12:00	<b>Special Session 2</b> Standardization of Measurements for Low-voltage DC Electricity Grids	<b>Special Session 3</b> Forecasting and Analytics for Power Quality Problems	<b>Technical Session 6</b> Electric Vehicles and Storage	-
12:05-12:30	<b>Special Meeting with Industries</b>	-	-	-
12:30-14:00	<b>Lunch</b>			
14:00-15:30	<b>Special Session 4</b> The IT4PQ project: Towards normative measurement procedures and tests for characterising Instrument Transformers for Power Quality measurements	<b>Technical Session 7</b> Transmission System and High Voltage Applications	<b>Technical Session 8</b> Voltage Dips and Interruptions	-
15:30-16:00	<b>Coffee Break</b>			
16:00- 17:30	<b>Special Session 5</b> Power Quality Data Analytics: A New World of Applications	<b>Technical Session 9</b> Smart Grids and Microgrids	<b>Technical Session 10</b> Harmonic Estimation Techniques	<b>Technical Session 11</b> Virtual Session 1
20:00-23:00	<b>Conference Dinner</b>			

## Wednesday June 1

	Room AM	Room A	Room B	Room V
09:00-10:30	<b>Special Session 6</b> Power Quality Issues in Railway Traction System	<b>Technical Session 12</b> Renewable Energy Sources 2	-	<b>Technical Session 13</b> Virtual Session 2
10:30- 11:00	<b>Coffee Break</b>			
11:05-11:30	<b>Special Meeting with Industries</b>	-	-	-
11:30-13:00	<b>Technical Session 14</b> Distortions from Customers' and Suppliers' Side	<b>Technical Session 15</b> Light Flicker and Voltage Fluctuations	<b>Technical Session 16</b> Power Quality Analysis	-
	Room AM			
13:00-13:30	<b>Closing Ceremony</b>			

# IEEE ICHQP 2022 –Programme Schedule

## Sunday May 29

<b>Room</b>	<b>Tutorial 1: Interharmonics: What are the Causes, How to Measure Them and Why Do We Care?</b> <b>A   14:30-16:00</b>
<b>Speakers</b>	<b>Jiri Drapela</b> ( <i>Vysokéučení Technickévbrně, CZ</i> ), <b>Leos Kukacka</b> ( <i>Technická Univerzita v Liberci, CZ</i> ), <b>Roberto Langella</b> ( <i>Università della Campania Vanvitelli, IT</i> )

<b>Room</b>	<b>Tutorial 2: Recent findings on EMC issues related to the harmonic behavior of modern power electronic devices.</b> <b>A   16:30-18:00</b>
<b>Speakers</b>	<b>Sasa Djokic</b> ( <i>University of Edinburgh, UK</i> ), <b>Jan Meyer</b> ( <i>Technische Universität Dresden, DE</i> )

## Monday May 30

<b>Room</b>	<b>Opening Session</b> <b>AM   08:30-09:00</b>
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<b>Room</b>	<b>Keynote speech 1: Power Quality and Harmonics – Some Research Topics for the Next 20 Year</b> <b>AM   09:00-09:30</b>
<b>Speaker</b>	<b>Alex McEachern</b> ( <i>McEachern Laboratories Inc., US</i> )

<b>Room</b>	<b>Keynote speech 2: The need for a holistic view: Future perspectives of Power Quality research</b> <b>AM   09:30-10:00</b>
<b>Speakers</b>	<b>Jan Meyer</b> ( <i>Technische Universität Dresden, DE</i> )

## Monday May 30

	<b><i>Panel Session 1: The Points of View of TSOs and DSOs on the Effects of Energy Transition on Power Quality: Trends, Challenges and Costs</i></b>
<b>Room</b>	<b>AM   10:30-12:00   Co-organized with Italian PES Chapter PE31</b>
<b>Chair</b>	<b>Alfredo Testa</b> ( <i>Università degli Studi della Campania "Luigi Vanvitelli", IT</i> ), <b>Luca Lo Schiavo</b> ( <i>ARERA, IT</i> )
	<b>Francesco Marzullo</b> ( <i>Terna, IT</i> ) <i>Power quality challenges in the transition to a decarbonized electricity system</i>
	<b>Juan Ortiz Noval</b> ( <i>E-Distribuzione, IT</i> ) The role of the DSO in supporting the improvement of Power Quality through the monitoring, measurement and analysis of energy parameters
	<b>Xavier Xianjun Yang</b> ( <i>EDF, FR</i> ) Impact on grid disturbance assessment methods and integration in international standardization
	<b>Julien Vanvilthoven</b> ( <i>ELIA, BE</i> ) The point of view of ELIA
	<b>Jacco Smit</b> ( <i>Tennet, NL</i> ) The point of view of Tennet
	<b>Gaurav Singh</b> ( <i>EPRI, US</i> ) The role of PQ in the energy transition: A US Perspective
	<b><i>Special Meeting with Industries</i></b>
<b>Room</b>	<b>AM   12:05-12:30</b>
<b>Chair</b>	<b>Roberto Langella</b> ( <i>Università degli Studi della Campania "Luigi Vanvitelli", IT</i> )
	<b><i>Panel Session 2: From planning to operation: Evaluating the emission of disturbing customer installations</i></b>
<b>Room</b>	<b>AM   13:45-15:15</b>
<b>Chair</b>	<b>Jan Meyer</b> ( <i>Technische Universität Dresden, DE</i> )
	<b>Mark Halpin</b> ( <i>Auburn University, US</i> ) Revisions to IEC EMC Standards in the 61000-3-X Series to determine emission limits for customer installations
	<b>Igor Papič</b> ( <i>University of Ljubljana, SE</i> ) Methods for continuous assessment of low-order harmonic emissions from customer installations
	<b>Sasa Djokic</b> ( <i>The University of Edinburgh, UK</i> ) Requirements for evaluating customer harmonic
	<b>Jan Meyer</b> ( <i>Technische Universität Dresden, DE</i> ) From emission limits to continuous contribution monitoring (Workflow for the assessment of a customer installation)
	<b>Thomas Naef</b> ( <i>Camille Bauer Metrawatt AG, CH</i> ) Experiences with practical implementation based on field measurements in Switzerland

## Monday May 30

### Special Session 1: Lightning and Lightning-induced Effects on Power Lines

**Room** Aula Magna (AM) | 15:20-16:50

**Chair** **Amedeo Andreotti** (*Università degli Studi di Napoli Federico II, IT*) and **Fabio Napolitano** (*ALMA MATER STUDIORUM - Università di Bologna, IT*)

- 28** Quantifying the Probability of Partial Discharge in VFD Fed Electric Motors Under Voltage Harmonics Concentration  
*Hassan, Waqar; Hussain, Ghulam Amjad; Mahmood, Farhan; Akmal, Muhammad*
- 66 (V)** Lightning-Induced Overvoltage Peaks Considering Soil Parameters Frequency-Dependence: New Approach with Dominant Frequency Associated with Lightning Current Front Time  
*Moura, Rodolfo; Mestriner, Daniele; Procopio, Renato; Schroeder, Marco Aurelio; Assis, Fernando; Delfino, Federico*
- 119** Comparison between two calculation tools for the appraisal of lightning induced voltages  
*Napolitano, Fabio; Tossani, Fabio; Andreotti, Amedeo; Borghetti, Alberto*
- 127** The Sommerfeld-Goubau Theory for the Transient Response of Towers  
*Stracqualursi, Erika; Araneo, Rodolfo; Brandao Faria, Jose Antonio Marinho; Burghignoli, Paolo; Andreotti, Amedeo*
- 83** Propagation and Attenuation of Surge Voltages and its consequence for the insulation coordination in Low-Voltage AC Circuits  
*Heremans, Florian; Vliegen, Kristof; Van Reusel, Koen*
- 30 (V)** Modeling High-voltage Transmission Line Operation under Double Earth Faults for Calculating Voltage Induced on Pipeline  
*Bulatov, Yuri; Kryukov, Andrey; Suslov, Konstantin*

### Technical Session 1: Distributed Energy Resources

**Room** A | 15:20-16:50

**Chair** **Yahia Baghzouz** (*University of Nevada, US*)

- 24 (V)** Operation of a Distributed Generation Plant in a Power Supply System with Non-linear and Asymmetric Load  
*Bulatov, Yuri; Kryukov, Andrey V.; Suslov, Konstantin*
- 56** Customer bill management using thermal and virtual electricity storage  
*Shaon, M.A.R.; Baghzouz, Yahia*
- 98** Analysis of power quality concerning COVID-19-related anomalies and integration of distributed energy resources  
*Antić, Tomislav; Capuder, Tomislav*
- 16** Deep Learning Method With Manual Post-Processing for Identification of Spectral Patterns of Waveform Distortion in PV Installations  
*Oliveira, Roger; Ravindran, Vineetha ; Ronnberg, Sarah; Bollen, Math*
- 69** The use of harmonic phasors and complex impedances in renewable power plant assessment  
*Beukes, Johan; Wattel, Jacques*
- 91 (V)** Improving PV Hosting Capacity by Implementing Energy Storage Systems on Distribution Networks  
*Jairo Giacomini Jr; Juan Carlos Cebrian; Helmo Paredes*

## Monday May 30

### Technical Session 2: Data Analytics, Monitoring and Measurements

**Room** B | 15:20-16:50

**Chair** Wilsun Xu (University of Alberta, CA)

- 120** Power Quality Meters Based on Digital Inputs: A Feasibility Study  
*Castello, Paolo; Sulis, Sara; Frigo, Guglielmo; Agustoni, Marco*
- 85** Low frequency currents source identification  
*Schachinger, Philipp; Albert, Dennis; Renner, Herwig*
- 103** Load Disaggregation Through Particle Filtering of Harmonic Features  
*Poyatos, Aarón; Isanbaev, Viktor; Blanco, José Luis; Viciano, Eduardo ; Ventura, Jorge; Arrabal-Campos, Francisco; Baños, Raúl; Alcayde, Alfredo A.; Montoya, F.*
- 71 (V)** Novelty Detection based on Dynamic Time Warping similarity metric applied to Power Quality Signals  
*Pires, Paulo PVL; Travassos, Fabricio; Kapisch, Eder B; Silva, Leandro R. M.; Duque, Carlos; Ribeiro, Paulo*
- 72 (V)** Analysis of Signal Processing Techniques for High Impedance Fault Detection in Distribution Systems  
*Lopes, Gabriela N; Lacerda, Vinicius; Vieira, Jose M; Coury, Denis*
- 117** Probabilistic Harmonic Estimation in Uncertain Transmission Networks Using Sequential ANNs  
*Zhao, Yuqi; Milanovic, Jovica*

## Tuesday May 31

### Technical Session 3: Disturbance Identification and Mitigation Techniques

**Room** AM | 08:30-10:00

**Chair** Julio Barros Guadalupe (Universidad de Cantabria, ES)

- 8** A new harmonic extraction method for estimation of the reference compensation current in shunt active power filters  
*Barros, Julio; de Apráiz, Matilde; Diego, Ramón I.*
- 25** A Voltage Unbalance Mitigation Technique for Low-voltage Applications with Large Single-phase Loads  
*Negri, Simone; Superti-Furga, Gabrio; Tironi, Enrico*
- 32** Detection and Protection Against Geomagnetically Induced Current via Harmonic Signature Analysis  
*Xie, Jiahao; Meliopoulos, Sakis; Cokkinides, George*
- 77** A Study on Estimation of Harmonic Sources and SC Installation Points in Distribution Systems  
*Kawasaki, Shoji; Shiraishi, Ryuji*
- 41 (V)** A New Damping Scheme of LLCL Filter for Grid-Tied PV Inverter Output Harmonics Mitigation  
*Zhong, Fang, Chang, Gary; Nguyen, Kha T.*
- 115** Entropy measures applied on Time-Frequency domain for detection and identification of Power Quality disturbances  
*Darambazar, Gandorj; Moukadem, Ali; Colicchio, Bruno; Patrice, Wira*

## Tuesday May 31

<b>Technical Session 4: Distortion from 2 to 150 kHz</b>	
<b>Room</b>	<b>A   08:30-10:00</b>
<b>Chair</b>	<b>Sarah Rönnberg</b> ( <i>Luleå Tekniska Universitet, SE</i> )
<b>129 (V)</b>	Telephone Interference from Solar PV Switching <i>Singh, Gaurav; Cooke, Thomas; Johns, Jason; Vega, Luis; Valdez, Ariel; Bull, Gloria</i>
<b>58</b>	Active High Pass Filter for the Measurement of Supraharmonics <i>Lambrechts, Johannes J; Beukes, Johan</i>
<b>37</b>	Supraharmonics within a datacenter-emission and propagation <i>Sutaria, Jil; Espin-Delgado, Angela; Ronnberg, Sarah</i>
<b>22</b>	Measurement and Analysis of the Low Voltage Network Impedance in the Supraharmonic Range <i>Erhan, Vlad; Slangen, Tim; Cuk, Vladimir; Cobben, Sjef; van Wijk, Thijs</i>
<b>29</b>	Application of Clustering and Dimensionality Reduction Methods for Finding Patterns on Supraharmonics Data <i>Espin-Delgado, Angela; Sutaria, Jil; Oliveira, Roger; Ronnberg, Sarah</i>
<b>90</b>	Analysis of supraharmonic emission in a microgrid in islanded and interconnected operation <i>Romero-L, Miguel; Quintero-Molina, Vanessa M; Garzón, Camilo; Pavas, Andres; Blanco-Castaneda, Ana M.; Kannan, Shrinath; Meyer, Jan;</i>

<b>Technical Session 5: Renewable Energy Sources 1</b>	
<b>Room</b>	<b>B   08:30-10:00</b>
<b>Chair</b>	<b>Angela Russo</b> ( <i>Politecnico di Torino, IT</i> )
<b>14</b>	Third Harmonic and its Relation to Solar Elevation Angle in a PV Installation with Solar Tracking Systems <i>Oliveira, Roger; Ronnberg, Sarah; Bollen, Math</i>
<b>59</b>	Managing Uncertainties in Wind Farm Harmonic Studies Using Unscented Transform <i>Lennerhag, Oscar; Bollen, Math</i>
<b>65</b>	Long-Term Harmonic Analysis of Grid-Connected Photovoltaic Systems <i>Šćekić, Lazar, Mujović, Saša</i>
<b>128</b>	Power Symmetrical Components as Grid Usage Indicator for Unbalanced Prosumers <i>Klusacek, Jan; Drapela, Jiri; Langella, Roberto</i>
<b>132</b>	A Study on Cross-Harmonic Generation by Large Three-phase Inverters in Solar Farm Environments <i>Liyanage, Samadhi; Perera, Sarath; Robinson, Duane</i>
<b>68</b>	Influence of System Parameters on Harmonic Distortion Contributions of Renewable Power Plants <i>Plessis, Francois D; Beukes, Johan</i>

## Tuesday May 31

<b>Special Session 2: Standardization of Measurements for Low-Voltage DC Electricity Grids</b>	
<b>Room</b>	<b>AM   10:30-12:00</b>
<b>Chair</b>	<b>Helko van den Brom</b> ( <i>VSL Dutch Metrology Insitute, NL</i> ) and <b>Daniele Gallo</b> ( <i>Università degli Studi della Campania "Luigi Vanvitelli", IT</i> )
<b>23</b>	Measurement Setup for a DC Power Reference for Electricity Meter Calibration <i>Frigo, Guglielmo; Braun, Jonathan</i>
<b>27</b>	Noise in DC Systems and the Potential Influence on Arc Detection <i>Wang, Da; Tichelen, Paul</i>
<b>39</b>	Testing of DC Electricity Meters with Broadband Conducted Electromagnetic Disturbances <i>Van den Brom, Helko E.; Marais, Zander; van Leeuwen, Ronald</i>
<b>55</b>	Detection of Dips, Swells and Interruptions in DC Power Network <i>Cipolletta, Giuliano; Delle Femine, Antonio; Gallo, Daniele; Seferi, Yljon; Fan, Fulin; Stewart, Brian</i>
<b>99</b>	On-site PQ measurements in a real DC micro-grid <i>Melero, Julio; Bruna, Jorge; Leiva, Javier</i>
<b>Special Session 3: Forecasting and Analytics for Power Quality Problems</b>	
<b>Room</b>	<b>A   10:30-12:00</b>
<b>Chair</b>	<b>Antonio Bracale and Pasquale De Falco</b> ( <i>Università degli Studi di Napoli Parthenope, IT</i> )
<b>12 (V)</b>	Predicting Resonance Frequencies in Distribution Networks with Grid-Connected Inverters <i>Moradi, Arash; Zare, Firuz; Yaghoobi, Jalil</i>
<b>49</b>	On the Forecast of the Voltage Sags Using the Measurements in Real Power Systems <i>Casolino, Giovanni Mercurio; Di Stasio, Leonardo; Varilone, Pietro; Verde, Paola; Noce, Christian; De Santis, Michele</i>
<b>51</b>	Transmission Grid Power Quality: Unbalance Factor Forecast by a Novel Three-Phase Power Flow <i>Benato, Roberto; Gardan, Giovanni; Rusalen, L.</i>
<b>78</b>	Application of Machine Learning Methods for Recognition of Daily Patterns in Power Quality Time Series <i>Strunz, Elias; Zyabkina, Olga; Meyer, Jan</i>
<b>88</b>	Trend Analysis for Power Quality Parameters based on Long-term Measurement Campaigns <i>Domagk, Max; Meyer, Jan; Huang, Wei; Wang, Tongxun; Feng, Dandan; Mayer, Heiko; Wenig, Simon; Lindner, Marco</i>
<b>139</b>	Probabilistic Power Quality Level Forecasting through Quantile Regression Models <i>Bracale, Antonio; Caramia, Pierluigi; De Falco, Pasquale; Carpinelli, Guido</i>

## Tuesday May 31



<b>Technical Session 6: Electric Vehicles and Storage</b>	
<b>Room</b>	<b>B   10:30-12:00</b>
<b>Chair</b>	<b>Dario Zaninelli</b> ( <i>Politecnico di Milano, IT</i> ) and <b>Linda Barelli</b> ( <i>Università degli Studi di Perugia, IT</i> )
<b>52 (V)</b>	Power Quality Indicators of Electric Vehicles in Distribution Grid <i>Wang, Xiaoxi; Jafari Kaleybar, Hamed; Brenna, Morris; Zaninelli, Dario</i>
<b>131</b>	Impact of Electrical Vehicle Residential Charging Stations on the Quality of the Low Voltage Network Supply <i>Pisano, Giuditta; Pilo, Fabrizio; Ruggeri, Simona; Soma, Gian Giuseppe; Falabretti, Davide; Grillo, Samuele; Gulotta, Francesco</i>
<b>87</b>	Observed Harmonic Levels on low voltage grid during EV DC Fast Charging <i>Giri, Manav; Ronnberg, Sarah; Bollen, Math</i>
<b>126 (V)</b>	Assessing the Harmonic and Supraharmonic Impact of Electric Vehicle Charging Facilities <i>Singh, Gaurav; Howe, William</i>
<b>112 (V)</b>	Comparison of harmonic models for a commercial battery energy storage system in charging and discharging mode <i>Abdelsamad, Ahmed S.; Myrzik, Johanna M.A.; Kaufhold, Elias; Meyer, Jan; Schegner, Peter</i>
<b>64</b>	On-Site Harmonic, Load Rejection Overvoltage, and Anti-Islanding Scheme Verification of a 20 MW BESS Interconnection to a Distribution Feeder <i>Nassif, Alexandre B; Wheeler, Keaton; Torquato, Ricardo; Freitas, Walmir</i>
<b>Special Meeting with Industries</b>	
<b>Room</b>	<b>AM   12:05-12:30</b>
<b>Chair</b>	<b>Mario Pagano</b> ( <i>Università degli Studi di Napoli Federico II, IT</i> )
<b>SS 4: IT4PQ project: Towards normative measurement procedures and tests for characterising Instrument Transformers for PQ measurements</b>	
<b>Room</b>	<b>AM   14:00-15:30</b>
<b>Chair</b>	<b>Gabriella Crotti</b> ( <i>Istituto Nazionale di Ricerca Metrologica, IT</i> ) and <b>Jan Meyer</b> ( <i>Technische Universität Dresden, DE</i> )
<b>79</b>	Impact of external influences on the frequency dependent transfer ratio of resin cast MV voltage instrument transformers <i>Stiegler, Robert; Meyer, Jan</i>
<b>82 (V)</b>	Reference system for current sensor calibrations at power frequency and for wideband frequencies <i>Chen, Yeying; Dubowik, Alexander; Mohns, Enrico</i>
<b>113</b>	Stray Parameter Evaluation of Voltage Transformers for PQ Measurement in MV Applications <i>Giordano, Domenico; Crotti, Gabriella ; Letizia, Palma Sara; Palladini, Daniele</i>
<b>42 (V)</b>	Adaptive Channel Equalization for Frequency Response Correction of Instrument Transformers <i>Resende, Denise Fonseca; Duque, Carlos; Nepomuceno, Erivelton; Lima, Marcelo; Silva, Leandro R. M.</i>
<b>17 (V)</b>	Combined Effect of Temperature and Humidity on Distorted Currents Measured by Rogowski Coils <i>Costa, Federica; Mingotti, Alessandro; Peretto, Lorenzo; Tinarelli, Roberto</i>
<b>123</b>	Practical Aspects of Accurate Harmonic Voltage Measurements in Transmission Systems <i>Meyer, Jan; Stiegler, Robert; Konzelmann, Simon; Kilter, Jako</i>

**Tuesday May 31**

<b>Technical Session 7: Transmission System and High Voltage Applications</b>	
<b>Room</b>	<b>A   14:00-15:30</b>
<b>Chair</b>	<b>Luigi Rubino</b> ( <i>University of Campania Luigi Vanvitelli, IT</i> )
<b>35 (V)</b>	Towards an Impedance-Based Criterion for Efficient Analysis of Resonant Overvoltages in the Swedish Transmission System <i>Lennerhag, Oscar; Sundberg, Gustav; Rogersten, Robert; Råström, Stefan</i>
<b>94 (V)</b>	Challenges in Application of the Traveling Wave-Based Fault Location Methods Applied to HVDC Systems: Evaluation of Classical One- and Two-Terminal Methods <i>Cândido Vieira, Júlio César; Fernandes, Damasio; Neves, Washington; Vigolvido Lopes, Felipe</i>
<b>124</b>	Study on the State Feedback Selection and Measurement for the Application of an LQRI Secondary Voltage Regulator to a Transmission System <i>Vicenzutti, Andrea; Marzolla, Fabio; Sulligoi, Giorgio; Giannuzzi, Giorgio Maria; Pisani, Cosimo</i>
<b>143 (V)</b>	Impact of Synchronous Compensators on the Robustness in Short-Circuit Conditions of Transmission Systems with High Share of RES <i>Bracale, Antonio; Caramia, Pierluigi; De Falco, Pasquale; Di Mambro, Enrica; Varilone, Pietro; Verde, Paola</i>
<b>44</b>	Secant Method Applied to Control of HVDC in the Harmonic Domain <i>Ramirez, Yovanny; Ramirez, Abner; Lazaroiu, Christian</i>
<b>108 (V)</b>	IEEE Power Quality Standards <i>Sabin, Daniel; Norwalk, Matthew; Kittredge, Kevin; Johnston, Steven</i>

<b>Technical Session 8: Voltage Dips and Interruptions</b>	
<b>Room</b>	<b>B   14:00-15:30</b>
<b>Chair</b>	<b>Paola Verde</b> ( <i>Università degli studi di Cassino e del Lazio Meridionale, IT</i> )
<b>15</b>	Impact of Voltage Dips Originated in the Transmission Grid on EV Charging Stations <i>Oliveira, Roger; Bollen, Math</i>
<b>21 (V)</b>	Voltage Sag Source Location Methods' Performance during Transient and Steady-state Periods <i>Mohammadi, Younes; Bollen, Math</i>
<b>121</b>	Power Quality Data Platform for Analysis and Location of Voltage Dips: a Preliminary Study <i>Castello, Paolo; Muscas, Carlo; Pegoraro, Paolo Attilio; Sulis, Sara; Rens, Johan; van Zyl, Jacobus</i>
<b>130</b>	Optimal Siting and Sizing of Electrical Energy Storages Accounting for Voltage Dip Economic Regulation <i>Mottola, Fabio; Proto, Daniela; Varilone, Pietro; Verde, Paola</i>
<b>9 (V)</b>	The Impacts of Voltage Disturbances Due to Faults In the Power Supply System of A Data Center <i>Ahmed, Kazi Main Uddin; Bollen, Math; Alvarez, Manuel; Letha, Shimi Sudha</i>

**Tuesday May 31**

**Special Session 5: Power Quality Data Analytics: a New World of Applications****Room** AM | 16:00-17:30**Chair** **Walmir Freitas** (*Universidade Estadual de Campinas, BR*) and **Ricardo Torquato** (*Universidade Estadual de Campinas, BR*)

- 7** Synchronized Waveforms – a Frontier of Data-Based Power System and Apparatus Monitoring, Protection and Control  
*Xu, Wilsun; Huang, Zhenyu; Xie, Xiaorong; Li, Chun*
- 31** Practical Methods for Online Monitoring of Harmonic Resonances in DFIG-Based Wind Parks  
*Torquato, Ricardo; Argüello, Andrés; Freitas, Walmir*
- 70** Evaluation of Metrics to Detect High Impedance Faults Using Real Current Signals  
*Lopes, Gabriela N; Menezes, Thiago; Vieira, Jose M*
- 104** Utilization of an Expert System Enhanced with Machine Learning for Automatic Voltage Sag Identification and Analysis  
*Sabin, Daniel; Peltier, Colton*
- 111 (V)** Classification of Scalogram Signatures for Power Quality Disturbances Using Transfer Learning  
*Salles, Rafael S.; Almeida, Gabriel; Ribeiro, Paulo*
- 145** Identification, Location, and Remediation of Incipient Fault and Failure Conditions Using Waveform Monitoring and Automated Analysis  
*Wischaemper, Jeff; Russell, B. Don; Benner, Carl L.; Manivannan, Karthick*

**Technical Session 9: Smart Grids and Microgrids****Room** A | 16:00-17:30**Chair** **Daniela Proto** (*Università degli Studi di Napoli Federico II, IT*)

- 34** Comparison between ring and radial configurations of the University of Trieste campus MV distribution grid  
*Chiandone, Massimiliano; Quaia, Stefano; Sulligoi, Giorgio; Vicenzutti, Andrea*
- 67 (V)** Assessment of FACTS devices nonsinusoidality in Smart Grid  
*Sosnina, Elena; Bedretdinov, Rustam; Ivanov, Anton*
- 75** A Decision Theory Approach for the Multi-objective Optimal Allocation of Active Filters in Smart Grids  
*Carpinelli, Guido; Mottola, Fabio; Proto, Daniela; Russo, Angela*
- 81** Harmonic interaction of LED lamps in islanded microgrids  
*Meinck, Moritz; Blanco-Castaneda, Ana M; Kannan, Shrinath; Meyer, Jan; Pavas, Andres*
- 106 (V)** Application of Photovoltaic Generation for Harmonic Distortion Mitigation in a Microgrid  
*de Barcellos Martins, Daniella; Oleskovicz, Mário; Rodrigues Pereira Jr, Benvindo*
- 96** Harmonic Distortion in Low Voltage Residential Grids Caused by LED Lamps  
*Hernandez, Jairo; Romero, Andrés; Mueller, Sascha; Meyer, Jan*

**Tuesday May 31**

<b>Technical Session 10: Harmonic Estimation Techniques</b>	
<b>Room</b>	<b>B   16:00-17:30</b>
<b>Chair</b>	<b>Sasa Djokic</b> ( <i>University of Edinburgh, UK</i> )
<b>11</b>	Reexamination of the Active Power Direction Method for Identifying the Sources of Harmonic Distortion <i>Senderovych, Gennadij; Shcherbakova, Polina; Abramovitz, Alexander</i>
<b>109</b>	Machine Learning Metamodeling of Harmonic Sources in LV Distribution Networks <i>Dada, Ansaar; Laboure, Eric; Bensetti, Mohamed; Yang, Xavier; George, Benoit; Caujolle, Mathieu</i>
<b>122</b>	Accurate and Fast Parallelized Assessment of Waveform Distortions in Presence of Low- and High-frequency Spectral Components <i>Carpinelli, Guido; Bracale, Antonio; Varilone, Pietro; Sikorski, Tomasz; Rezmer, Jacek; Kostyla, Pawel</i>
<b>26</b>	Analysis of Harmonic Propagation in Power Systems Using Standing Waves <i>Bukh, Bjarne S; Leth Bak, Claus; Faria da Silva, Filipe</i>
<b>118 (V)</b>	GHG Emissions, present energies, future with storage: Highlight for China, USA and Brasil <i>Santos, Silverio Penin y; Carvalho, Elias Felipe de</i>
<b>134</b>	Use of Actual and Reference Impedances in Two Harmonic Emission Assessment Methods <i>Spelko, Aljaz; Papic, Igor; Iqbal, Zafar; Djokic, Sasa</i>

<b>Technical Session 11: Virtual Session 1</b>	
<b>Room</b>	<b>V   16:00-17:30</b>
<b>Chair</b>	<b>Carlos Duque</b> ( <i>Universidade Federal de Juiz de Fora, BR</i> )
<b>100 (V)</b>	The Difficulty to accurately assess the Active Losses due to Harmonics <i>Costea, Marian; Leonida, Tudor</i>
<b>95 (V)</b>	Investigation of harmonic resonance from reactive compensation in hospital electrical installations with magnetic resonance imaging (MRI) <i>Neves Neto, Joao Cardoso; Almeida, Carlos; Delbone, Edval; Starosta, José</i>
<b>46 (V)</b>	An investigative study of the application of fundamental operations of mathematical morphology in the diagnosis of oscillatory transients <i>Hoffmann, Alessandra; Beuter, Carlos H; Oleskovicz, Mario</i>
<b>60 (V)</b>	Harmonic Selection-based Analysis for High Impedance Fault Location Using Stockwell Transform and Random Forest <i>Lopes, Gabriela N; S. Menezes, Thiago; Vieira, Jose M.</i>
<b>63 (V)</b>	Independent Component Analysis for Distortion Estimation at Different Points of a Network with Multiple Harmonic Sources <i>de Oliveira, Mateus M; A. A. Lima, Marcelo ; Silva, Leandro R. M.; A. Duque, Carlos; Ribeiro, Paulo</i>
<b>33 (V)</b>	A 3-phase 4-wire Shunt Active Filter with Selectable Harmonic Compensation and an Auto-Calibration Harmonic Algorithm <i>Bianchin, Carlos; Oliveira, Cretan; Melo, Priscila F; Schmal, Ricardo; Gati, Victor; Garcia, Flavio; Almeida, Patrick; Maneira, Wiviane</i>

**Wednesday June 1**

<b>Special Session 6: Power Quality Issues in Railway Traction System   Room AM   09:00-10:30</b>	
<b>Chair</b>	<b>Philippe Ladoux</b> ( <i>Université de Toulouse, FR</i> ) and <b>Mauro Carpita</b> ( <i>Haute école d'Ingénierie et de Gestion du Canton de Vaud, CH</i> )
<b>18</b>	Waveform Distortion Emission Assessment on Pantograph Measurements from Low-Frequency Railway Electrification <i>Salles, Rafael S.; Ronnberg, Sarah; Mariscotti, Andrea</i>
<b>20</b>	Calculation of the Voltage Unbalance Factor for 25kV-50Hz Railway Substations <i>Flumian, Didier DF; Ladoux, Philippe; Sarraute, Emmanuel</i>
<b>48</b>	Interharmonic Analysis for Static Frequency Converter Station Supplying a Swedish Catenary System <i>Salles, Rafael S.; Ronnberg, Sarah</i>
<b>74</b>	Catenary overvoltage stabilization of DC railway electrical system by integrating EV charging stations <i>Guo, Baoling; Pouget, Julien ; Bossoney, Luc; Carpita, Mauro; Meier, Thomas; Maye, Jean-Paul</i>
<b>125</b>	Voltage Quality of an AC Grid Supplying a Railway Power System with Energy Saving Strategy <i>Andreotti, Amedeo; Di Pasquale, Antonio; Mottola, Fabio; Proto, Daniela; Pagano, Mario</i>
<b>140 (V)</b>	Modern Power Quality Improvement Devices Applied to Electric Railway Systems <i>Brenna, Morris; Jafari Kaleybar, Hamed; Foadelli, Federica; Zaninelli, Dario</i>

<b>Technical Session 12: Renewable Energy Sources 2   Room A   09:00-10:30</b>	
<b>Chair</b>	<b>Fabio Mottola</b> ( <i>Università degli Studi di Napoli Federico II, IT</i> )
<b>19</b>	Analysing Waveform Distortion in Wind Power Plants by a Deep Learning-Based Graphical Tool <i>Oliveira, Roger; Salles, Rafael S.; Bollen, Math; de Carli, Miguel</i>
<b>36</b>	Power Quality Comparison of Wind Turbines and Oscillating Wave Columns Considering IEC 61000 <i>Nagle, Conor; Kelley, James ; Sengor, Ibrahim; Hayes, Barry P.</i>
<b>93 (V)</b>	Aggregation of multiple inverter-based harmonic sources within a renewable energy generation plant <i>David, Jason; Robinson, Duane; Elphick, Sean</i>
<b>102 (V)</b>	Cable Effects on Noise Propagation in Distribution Networks with Renewable Sources <i>Wan, Lu; Hamid, Abduselam; Wu, Xinglong; Liu, Xiaokang; Grassi, Flavia; Spadacini, Giordano; Pignari, Sergio; Zanoni, Michele; Chiumeo, Riccardo; Tenti, Liliana</i>
<b>133</b>	Intelligent Low Voltage Regulator for Solving PV Overvoltages Problems in Power Distribution Systems <i>Ghiani, Emilio; Di Gregorio, Rocco</i>
<b>135</b>	Filter and Controller Identification for Stability Analysis of a Grid-Connected 3-Phase PV Inverter <i>Iqbal, Zafar; Djokic, Sasa; Meyer, Jan; Mueller, Sascha; Kaufhold, Elias</i>
<b>142 (V)</b>	Impact of urbanization development on power system operation <i>Balaban, Georgiana; Lazaroiu, Christian; Dumbrava, Virgil; Roscia, Maria Cristina</i>

**Wednesday June 1**

**Technical Session 13: Virtual Session 2****Room, Chair V | 09:00-10:30, Gary Chang** (*National Chung Cheng University, TW*)

- 53 (V)** Quantifying the impact of supply frequency adjustments for DER control on consumer appliances  
*Elphick, Sean; Robinson, Duane; Knott, Jonathan; Perera, Sarath; Afandi, Nurul Izzah; Wilmot, Nigel*
- 80 (V)** International survey on voltage harmonic unbalance in low voltage networks  
*Yadav, Jayashree Rajaram; Blanco-Castaneda, Ana M; Meyer, Jan; Vasudevan, Krishna*
- 86 (V)** Development of Harmonics Measurement System for Energy-Saving Lamps- An Educational Platform  
*Chen, Y. Y.; Chang, Gary; Li, G. Y.; Chen, H. J.; Wu, J. Z.*
- 57 (V)** The Piecewise Probabilistic Model for Aggregate Harmonic Load Based on Measured Data  
*Ma, Hai Xing; Wang, Ying; Xiao, Xian-Yong; Yang, Shuang; Chen, Yong-Tao; Ma, Xing*
- 38 (V)** An Intelligent Active Power Filter to Mitigate Harmonics and Interharmonics  
*Eslami, Ahmadreza; Negnevitsky, Michael; Franklin, Evan; Lyden, Sarah*
- 62 (V)** A Passivity-based Hybrid Control Strategy for Islanded AC Microgrids  
*Yang, Mengling; Wang, Yang; Chen, Song; Xiao, Xianyong*

**Special Meeting with Industries****Room, Chair AM | 11:05-11:30, Pierluigi Caramia** (*Università degli Studi di Napoli Parthenope, IT*)**Technical Session 14: Distortions from Customers' and Suppliers' Side****Room, Chair AM | 11:30-13:00, Morris Brenna** (*Politecnico di Milano, IT*)

- 110** Utilization of Allocated Harmonic Emission by Customer Installations connected to Low and Medium Voltage Networks  
*Pourarab, Morteza; Domianus, Oliver; Meyer, Jan; Naef, Thomas; Rölli, Roger; Ulrich, Max*
- 54** Applicability of LED lamps classification methods  
*Gutiérrez Ballesteros, Elena; Ronnberg, Sarah; Gil de Castro, Aurora*
- 144 (V)** A Practical Approach to Mitigate the Harmonic Distorsion in a Microgrid, Case Study  
*A. Muresan, O. Fatj, L. Czumbil, A. Ceclan, D. I. Jurj, R. Rizzo, D. D. Micu*
- 97** Immunity of Mass-market Electrical Appliances to Harmonic Distortion of the Supply Voltage  
*Khokhlov, Victor; Möller, Friedemann; Meyer, Jan; Schegner, Peter*
- 13 (V)** Including load impedance uncertainty in harmonic impedance seen from a low-voltage customer  
*Nakhodchi, Naser; Bollen, Math*
- 61** Voltage-Current Ratio Difference Method: Recommended for IEEE Standard 1547 to Determine the Customer Harmonic Contribution  
*Safargholi, Farhad; Malekian Boroujeni, Kia; Santjer, Fritz*

**Wednesday June 1**

### Technical Session 15: Light Flicker and Voltage Fluctuations

**Room** A | 11:30-13:00

**Chair** Jiri Drapela (*Vysoké učení technické v Brně, CZ*)

- 4 IEC Flickermeter Measurement Results for Distorted Modulating Signal while Supplied with Distorted Voltage  
*Kuwalek, Piotr*
- 141 (V) Flicker dependency on voltage fluctuation at frequencies greater than power frequency  
*Michalski, Mateusz; Wiczynski, Grzegorz*
- 89 Response of Flicker Assessment Algorithms to Interharmonic Distortion Patterns  
*Kukacka, Leos; Drapela, Jiri; Meyer, Jan; Stiegler, Robert*
- 40 (V) Modified Method of Detecting Rapid Voltage Changes in a Medium Voltage Network  
*Löfgren, Isabelle; Gutiérrez Ballesteros, Elena; Ronnberg, Sarah*
- 43 Decomposition Problem in Process of Selective Identification and Localization of Voltage Fluctuation Sources in Power Grids  
*Kuwalek, Piotr*
- 136 New Comprehensive Analytical Model of Single-phase AC/DC Diode Rectifiers in the presence of Interharmonics in Supply Voltage  
*Langella, Roberto; Testa, Alfredo; Vendemia, Vincenzo; Drapela, Jiri*

### Technical 16: Power Quality Analysis

**Room** B | 11:30-13:00

**Chair** Adam J. Collin (*Università degli Studi del Sannio, IT*)

- 137 Development of a Power Dependent Frequency Domain Model of an Inverter-driven Heat Pump  
*Collin, Adam; Langella, Roberto; Testa, Alfredo; Yanchenko, Sergej*
- 76 Survey of voltage unbalance and unbalanced power in German public LV networks  
*Möller, Friedemann; Meyer, Jan*
- 5 Geometric Power and Poynting Vector: a Physical Derivation for Harmonic Power Flow using Geometric Algebra  
*Montoya, Francisco G.; Arrabal-Campos, Francisco M. ; Alcayde, Alfredo A.; Prado-Orbán, Xabier; Mira, Jorge*
- 50 Determination of Instantaneous Powers from a Novel Time-Domain Parameter Identification Method of Non-Linear Single-Phase Circuits  
*Montoya, Francisco G.; De León, Francisco; Arrabal-Campos, Francisco; Alcayde, Alfredo A.*
- 10 Multi-objective Optimization Aiming to Minimize the Number of Power Quality Monitors and Multiple Fault Estimations in Unbalanced Power Distribution Systems; *Martins, Paulo E; Oleskovicz, Mário*
- 101 Harmonic Resonance Characteristics of a residential low voltage distribution Network considering typical Variations of Grid and Customer Characteristics  
*Scholtz, Stephan; Kannan, Shrinath; Meyer, Jan*