Oral Presentations – all times listed are CEST (UTC+2)

Day 1 (31 May)

9:00-9:20	**Welcome** **Francesca Pennecchi** (MSMM 2021 co-chair, Istituto Nazionale di Ricerca Metrologica, IT) **Grazia Vicario** (MSMM 2021 co-chair, Politecnico di Torino, IT) **Pietro Asinari** (Scientific Director, Istituto Nazionale di Ricerca Metrologica, IT)	
9:20-10:20	**Joint ENBIS/MATHMET session** **(Chairs: Francesca Pennecchi and Grazia Vicario)** **Murat Caner Testik** (ENBIS President) and **Antonio Pievatolo** (ENBIS Former President) **Markus Bär** (MATHMET Chair), **Sebastian Heidenreich** (MATHMET Secretary), **Galina Kulikova** (EMN-Manager) and **Katy Klauenberg** (Measuring Uncertainty Training)	
10:25-11:25	**Progress on the GUM framework - Update from the JCGM WG1** **(Chairs: Walter Bich and Maurice Cox)**	**Machine Learning for Metrology I** **(Chair: Sebastian Heidenreich)**
10:25-10:45	ID 131 *GUM Part 6 – Developing and using measurement models. An outline* **Walter Bich** (Istituto Nazionale di Ricerca Metrologica, IT)	ID 106 *Uncertainty evaluation for machine learning: metrology requirements and open challenges* **Andrew Thompson** (National Physical Laboratory, UK)
10:45-11:05	ID 109 *Simple informative prior distributions for type A uncertainty evaluation with small samples* **Maurice Cox** (National Physical Laboratory, UK)	ID 71 *Deep Learning for inverse problems – applying ensemble learning for uncertainty quantification* **Lara Hoffmann** (Physikalisch-Technische Bundesanstalt, DE)
11:05-11:25	ID 130 *Transferability of GUM-S1 type A uncertainties - a Bayesian perspective* **Gerd Wübbeler** (Physikalisch-Technische Bundesanstalt, DE)	ID 187 *Deep Learning based instance segmentation: application to agglomerated titanium dioxide particles measured by scanning electron* **Paul Monchot** (Laboratoire national de métrologie et d'essais, FR)
11:25-11:40	**15 min break**	
11:40-12:40	**Sensor calibration** **(Chair: João Alves e Sousa)**	**Inverse problems in metrology** **(Chair: Sebastian Heidenreich)**
11:40-12:00	ID 48 *Metrological redundancy in distributed measurements* **Gertjan Kok** (Van Swinden Laboratorium, NL)	ID 160 *Inversion of point clouds for holistic Screw Thread Metrology* **Anita Przyklenk** (Physikalisch-Technische Bundesanstalt, DE)
12:00-12:20	ID 138 *Co-calibration of sensor networks* **Alistair Forbes** (National Physical Laboratory, UK)	ID 132 *Model error in Bayesian inversion* **Maren Casfor Zapata** (Physikalisch-Technische Bundesanstalt, DE)
12:20-12:40	ID 129 *A novel method for Callendar-Van Dusen interpolation of temperature calibration points* **Graziano Coppa** (Istituto Nazionale di Ricerca Metrologica, IT)	ID 136 *Invertible neural networks for grazing incidence X-ray fluorescence parameter reconstruction* **Nando Farchmin** (Physikalisch-Technische Bundesanstalt, DE)
12:40-13:30	**50 min lunch**	

13:30-14:30	***INVITED LECTURE*** ***Classical and Bayesian optimization for efficient experimental designs in metrology*** **Blaza Toman (National Institute of Standards and Technology, US)** **(Chair: Francesca Pennecchi)**		
14:35-15:35	**Uncertainty I** **(Chair: Walter Bich)**	**Designs of measurement experiments** **(Chair: Grazia Vicario)**	**Metrology in chemistry and chemometrics** **(Chair: Stephen Ellison)**
14:35-14:55	ID 180 *A knowledge-based evaluation of measurement non-repeatability* **Carlo Carobbi** (Università degli studi di Firenze, IT)	ID 64 *Optimal designs for hypothesis testing with heteroscedastic experimental groups* **Marco Novelli** (Università di Bologna, IT)	ID 162 *In the avantgarde of a reliable methodology for automatic identification of microplastics by micro-ATR-FTIR spectroscopy* **Vanessa Morgado** (Universidade de Lisboa, PT)
14:55-15:15	ID 176 *Uncertainty of thermodynamic properties available via online data banks: Vapor pressure as case study* **Maricarmen Lecuna** (Politecnico di Torino, IT)	ID 70 *Evaluating erosion performance of cold-sprayed coatings by Design of Experiments* **Elisa Verna** (Politecnico di Torino, IT)	ID 177 *Monte Carlo bottom-up evaluation of the uncertainty of complex sample preparation: Elemental determination in sediments* **Ricardo Bettencourt da Silva** (Universidade de Lisboa, PT)
15:15-15:35	ID 80 *Uncertainty expression by finite information quantities* **Luca Callegaro** (Istituto Nazionale di Ricerca Metrologica, IT)	ID 73 *A GUI for Bayesian sample size determination* **Jörg Martin** (Physikalisch-Technische Bundesanstalt, DE)	ID 145 *Discriminant analysis of vegetable oils by TGA-GC/MS combined with chemometrics and data fusion without sample pretreatment* **Xia Zhou** (National Institute of Metrology, Beijing, CHN)
15:40-16:40	**Uncertainty II** **(Chair: Alistair Forbes)**	**Human exposure to electromagnetic fields and ionizing radiations** **(Chair: Oriano Bottauscio)**	**Measurements on nominal and ordinal scales** **(Chair: Amalia Vanacore)**
15:40-16:00	ID 133 *Approximating Gaussian Process regression models using banded matrices* **Kavya Jagan** (National Physical Laboratory, UK)	ID 124 *Factors relating to gradient coil and radiofrequency induced heating within implanted orthopaedic devices during MRI* **Jenny Wooldridge** (National Physical Laboratory, UK)	ID 55 *Interlaboratory comparison of nominal data on macroscopic examination of welds* **Tamar Gadrich** (ORT Braude College, Karmiel, ISR)
16:00-16:20	ID 68 *How to improve linear interpolation uncertainty of humidity profiles* **Pietro Colombo** (Università degli studi di Bergamo, IT)	ID 161 *Identification of main factors impacting human exposure in inductive power transfer systems* **Lionel Pichon** (CentraleSupélec - Université Paris-Saclay, Sorbonne Université, FR)	ID 113 *Entropy-based explanations of multidimensionality in ordinal responses* **Leslie Pendrill** (RI.SE Research Institute of Sweden, SWE)
16:20-16:40	ID 81 *Uncertainty estimation by bootstrap sampling of area shape function in nano-indentation testing* **Giacomo Maculotti** (Politecnico di Torino, IT)	ID 98 *Radiation dose estimation via the contaminated Poisson and negative binomial methods in partial-body exposures* **Adam Errington** (Durham University, UK)	ID 168 *Simultaneous inference for comparing classifier performance via kappa-type coefficients* **Amalia Vanacore** (Università di Napoli "Federico II", IT)

16:45-16:50	**Conclusion of day 1**
16:50-17:15	**Scientific coffee time with MATHMET: open discussion, questions and answers on the research topics of the MATHMET Strategic Research Agenda** **(Chair: Sebastian Heidenreich)** *This is an informal session organized by MATHMET Members to offer* *(a) an introduction to the MATHMET Strategic Research Agenda (SRA),* *(b) descriptions of the main research topics,* *(c) an open discussion with the aim to collect input and feedback from stakeholders and end-users*

Day 2 (1 June)

9:00-9:10	**Welcome to day 2**	
9:10-10:10	***INVITED LECTURE*** ***Hybrid Twins for empowering performance-based engineering based on advanced real-time physics, informed AI and smart-metrology*** **Francisco Chinesta (École Nationale Supérieure d'Arts et Métiers ParisTech, FR)** **(Chair: Grazia Vicario)**	
10:15-11:15	**Digital twins and virtual experiments** **(Chair: Alessandra Manzin)**	**Flow simulation in metrology** **(Chair: Sonja Schmelter)**
10:15-10:35	ID 59 *"Biodigital Twins": optimizing orthopaedic implants* **Michael Gasik** (Aalto University Foundation, FIN)	ID 123 *Simulation of temperature measurement of inhomogeneous flows by ultrasonic flow meters* **Gertjan Kok** (Van Swinden Laboratorium, NL)
10:35-10:55	ID 170 *In silico experiments to guide magnetic hyperthermia pre-clinical tests* **Marta Vicentini** (Politecnico di Torino, IT)	ID 163 *Enhancement of multiphase flow simulations by turbulence damping at the gas-liquid interface* **Jiri Polansky** (Czech Technical University, Prague, CZE)
10:55-11:15	ID 191 *Virtual sensors development for real-time quality assessment in continuous production* **Manolo Venturin** (EnginSoft SpA, IT)	ID 178 *Prediction of the flow downstream of a 90°-elbow with arbitrary curvature radius and its effect on the accuracy of flow meters* **Andreas Weissenbrunner** (Physikalisch-Technische Bundesanstalt, DE)
11:15-11:30	**15 min break**	
11:30-12:30	**A Quality Management System for data and software - Update from the EMPIR MATHMET Project** **(Chair: Peter Harris)**	**11:30-12:30** **Artificial Intelligence in pharma industry** **(Chairs: Bernard Francq and Dan Lin)**
11:30-12:30	ID 172 *A MATHMET Quality Management System for data and software* **Keith Lines** (National Physical Laboratory, UK) *This is a special session organized by MATHMET Members to offer:* *(a) an introduction to the MATHMET Quality Management System (QMS) for metrology software and data,* *(b) descriptions of case studies being used by different MATHMET partners to apply the QMS,* *(c) a round table with the aim to collect input and feedback from stakeholders and end-users*	11:30-11:50 ID 195 *Deep Drug Discovery* **Djork-Arné Clevert** (Bayer AG, Machine Learning Research, Berlin, DE) 11:50-12:10 ID 143 *Aggregation in Cell Culture – App development for cell clumping scoring* **Edouard Duquesne** (Sanofi SA, Vitry-sur-Seine, FR) 12:10-12:30 ID 197 *Protein language modeling and transfer learning applied to predict TCR-epitope affinity* **Gurpreet Singh** (GlaxoSmithKline plc, Upper Providence, PA, USA)

12:30-13:20		**50 min lunch**	
13:20-14:20	**Hyperthermia techniques - Update from the EMPIR RaCHy Project** **(Chair: Alessandra Manzin)**	**Machine Learning for Metrology II** **(Chair: Nicolas Fischer)**	**Examples of measurement uncertainty evaluation - Update from the EMPIR EMUE Project** **(Chair: Maurice Cox)**
13:20-13:40	ID 158 *Uncertainty budget for acoustic characterization of tissue mimicking materials* **Piero Miloro** (National Physical Laboratory, UK)	ID 72 *Applying deep learning in metrology - an overview over some potentials and challenges* **Jörg Martin** (Physikalisch-Technische Bundesanstalt, DE)	ID 182 *Limitations of uncertainty propagation -- Measurement uncertainty for the routine determination of aqua regia extractable metals in soil* **Stephen L R Ellison** (LGC Limited, UK)
13:40-14:00	ID 120 *Simulation guided design of a TEM applicator for in vitro RF hyperthermia* **Ioannis Androulakis** (Department of Radiotherapy, Erasmus MC Cancer Institute, Rotterdam, NL)	ID 89 *A Gaussian Process approach to uncertainty evaluation for machine learning* **James Donlevy** (National Physical Laboratory, UK)	ID 196 *The role and use of measurement uncertainty in addressing specification requirements: medical temperature examples* **John Greenwood** (United Kingdom Accreditation Service, UK)
14:00-14:20	ID 183 *Modelling of iron oxide nanocubes for magnetic hyperthermia application* **Riccardo Ferrero** (Istituto Nazionale di Ricerca Metrologica, IT)	ID 156 *Is There Consistency in ML Interpretability?* **Ashish Sundar** (National Physical Laboratory, UK)	ID 198 *Evaluation of measurement uncertainty in totalization of volume measurements in drinking water supply networks* **Alvaro Ribeiro** (Laboratório Nacional de Engenharia Civil, Lisboa, PRT)
14:25-15:25	**Quantitative imaging - Update from the EMPIR QUIERO Project** **(Chair: Luca Zilberti)**	**Machine Learning for Metrology III** **(Chair: Markus Bär)**	**Regression and prediction** **(Chair: Maurizio Galetto)**
14:25-14:45	ID 95 *Optimisation of data acquisition for cardiac Magnetic Resonance Fingerprinting* **Constance Gatefait** (Physikalisch-Technische Bundesanstalt, DE)	ID 175 *The role of uncertainty in data-driven turbulence modelling* **Andrea Ferrero** (Politecnico di Torino, IT)	ID 78 *Generalization of least square method for straight line regression – A new approach* **Jacek Puchalski** (Central Office of Measures, Warsaw, POL)
14:45-15:05	ID 101 *Three dimensional MRF obtains highly repeatable and reproducible multi-parametric estimations in the healthy human brain* **Matteo Cencini** (IRCCS Stella Maris and IMAGO7 Foundation, Pisa, IT)	ID 69 *Forest embeddings for gene expression data modeling of tumor stage and survival in bladder cancer* **Mauro Nascimben** (Enginsoft Spa & University of Eastern Piedmont, IT)	ID 146 *Tensor based modelling of human motion in a collaborative human-robot approach* **Philipp Wedenig** (Joanneum Research, Graz, AUT)
15:05-15:25	ID 100 *Towards a metrological characterisation of electric properties tomography* **Alessandro Arduino** (Istituto Nazionale di Ricerca Metrologica, IT)	ID 134 *Convolutional neural network performance in the presence of physiological ECG noise* **Jenny Venton** (National Physical Laboratory, UK)	ID 153 *Modeling pyroelectric sensor signals for predicting proximity* **Franz Moser** (Joanneum Research, Graz, AUT)

15:30-16:10	**Extension of JCGM 106:2012 framework to industrial processes** **(Chair: Katy Klauenberg)**	**Multilevel measurement for business and industrial workforce development** **(Chair: Antonio Pievatolo)**
15:30-15:50	ID 144 *Conformity assessment of lots in the framework of JCGM 106:2012* **Rainer Göb** (Universität Würzburg, DE)	ID 65 *Multilevel measurement for business and industrial workforce development: Part I* **Jan Morrison** (TIES: Teaching Institute for Excellence in STEM, Cleveland, OH, USA)
15:50-16:10	ID 116 *Mathematical tools for a better analysis of the covariance in industrial data* **Peggy Courtois** (Deltamu, Cournon d'Auvergne, FR)	ID 66 *Multilevel measurement for business and industrial workforce development: Part II* **William Fisher** (Living Capital Metrics LLC, Sausalito, CA, USA)
16:15-16:30	**Conclusion**	

Poster Presentations

The poster virtual room is always open during the Workshop

ID 114 *A measure of the statistical homogeneity of turbulent simulations*
Massimo Germano (Duke University, Durham, NC, USA)

ID 112 *Forecasting the COVID-19 epidemic integrating symptom search behavior: an infodemiology study*
Eugenio Alladio (Università degli Studi di Torino, IT)

ID 194 *Measurement system analysis of the CSLT measurement system - An experiment to defect diagnoses in deep drilled shafts*
Eric Ho (City University of Hong Kong, CHN)

ID 76 *Automated ML Toolbox for cyclic sensor data*
Tanja Dorst (ZeMA gGmbH, Saarbrücken, DE)

ID 115 *Intrinsic and metrological correlations on the risks of false conformity decisions*
Luciana Separovic (Faculdade de Ciências Farmacêuticas, Universidade de São Paulo, BRA)

ID 122 *A local-integral approach to electric properties tomography*
Luca Zilberti (Istituto Nazionale di Ricerca Metrologica, IT)

ID 139 *Understanding neural network classifications: Local Interpretable Model-agnostic Explanations (LIME)*
Hamza Zaheer (National Physical Laboratory, UK)

ID 148 *A probability-box based approach for measurement problems*
Tathagata Basu (Durham University, UK)