



# Program



associazione  
angelo marcello anile



18th European Conference on Mathematics for Industry - ECMI 2014  
June 9-13, 2014, Taormina – Sicily, Italy

Program

## **Sunday 8 June**

15:30 – 20:30 Registration

17:30 – 20:00 Anile Legacy – ECMI 2014 Satellite Event

20:00 – 22:00 Welcome Cocktail

## Monday 9 June

**Monday 9 June, 08:30 – 10:30**

Main Conference Room - Ettore Majorana Room: MS 36

Manuel J Castro Diaz, Carlos Parés Madroñal and Giovanni Russo

### **New progress on numerical modeling of Geophysical flows for environment, natural hazards, and risk evaluation**

08:30 José M. González Vida, Manuel J. Castro, Jorge Macías, Marc de La Asunción, Sergio Ortega and Carlos Sánchez-Linares

*2D GPU-based HySEA model for tsunami simulation. Some practical examples.*

08:54 Edie Miglio

*Multidimensional Coupling for Shallow Water Flows*

09:18 Manuel Jesus Castro Diaz, Yuanzhen Cheng, Alina Chertock, Alexander Kurganov and Tomas Morales de Luna

*Path-Conservative Central-Upwind Schemes for Nonconservative Hyperbolic Systems*

09:42 Alessandro Valiani and Valerio Caleffi

*Some results on the numerical treatment of Movable Bed Shallow Water Equations*

10:06 Christophe Berthon

*Well-balanced schemes for Shallow-Water models with strongly non-linear source terms*

Conference Room 1 - Luigi Pirandello Room: MS 60

Stefano Micheletti and Simona Perotto

### **Multiphysics simulations with industrial applications**

08:30 Suzanne Shontz and Corina Drapaca

*Optimal Shunt Placement for Hydrocephalus Treatment Via Patient-Specific, Multiphysics Simulations*

09:00 Simone Pezzuto, Johan Hake, Samuel Wall and Joakim Sundnes

*Numerical and constitutive aspects of the cardiac electromechanical coupling*

09:30 Matteo Pischiutta and Gianni Arioli

*A reduced nonlinear model for the simulation of two phase flow in a horizontal pipe*

10:00 Marco Panzeri, Monica Riva, Alberto Guadagnini and Shlomo P. Neuman

*Field application of groundwater flow data assimilation through Moment Equation based Ensemble Kalman Filter*

Conference Room 2 - Salvatore Quasimodo Room: MS 2

Ana Carpio

### **Imaging and inverse problems**

08:30 Pedro Gonzalez Rodriguez, Arnold D. Kim and Miguel Moscoso

*Imaging in an optically thin media using L1-optimization*

09:00 Ana Carpio and Maria-Luisa Rapun

*Domain and parameter reconstruction in photothermal imaging*

- 09:30 Peter Monk and Virginia Selgas  
*Transmission eigenvalues for a dielectric object resting on a perfect conductor*
- 10:00 Antonio Marquina, Alejandro Torres, Jose Antonio Font and Jose Maria Ibañez  
*Variational Models and Numerical Algorithms for one-dimensional Signal Reconstruction of Noisy and Blurry Signals: Application to the signal recovery for future detection of Gravitational Waves*

Conference Room 3 - Vincenzo Bellini Room: MS 38

Dietmar Hoemberg, Masahiro Yamamoto and Nataliya Togobytska

**Simulation and control of hot-rolling**

- 08:30 Dietmar Hoemberg, Shuai Lu and Masahiro Yamamoto  
*Nucleation, growth, and grain size evolution in dual phase steels*
- 09:00 Jens Seidel  
*Model reduction for rolling problems*
- 09:30 Dietmar Hoemberg, Klaus Krumbiegel and Nataliya Togobytska  
*Optimal control approach for production of multiphase steels*

Conference Room 4 - Giovanni Verga Room: MS 42

Hermes Gadelha and Philip Maini

**Nature's natural order: from individual to collective behaviour and self-organization**

- 08:30 Georges Chamoun, Mazen Saad and Raafat Talhouk  
*Mathematical and numerical analysis of a coupled anisotropic chemotaxis-fluid model*
- 09:00 Hermes Gadelha  
*Mechanoregulation of molecular motors in flagella*
- 09:30 Marco Polin, Douglas Brumley, Kirsty Y. Wan and Raymond E. Goldstein  
*Flagellar synchronisation through direct hydrodynamic interactions*
- 10:00 Ulrich Dobramysl and Radek Erban  
*Stochastic multi-scale modelling of filopodial growth*

Belvedere Room - Archimede Room: MS 9

Andreas Rauh and Luise Senkel

**Robust Variable-Structure Approaches for Control and Estimation of Uncertain Dynamic Processes**

- 08:30 Piotr Leśniewski and Andrzej Bartoszewicz  
*Sliding mode data flow regulation for connection-oriented networks with unpredictable packet loss ratio*
- 09:00 Horst Schulte and Sören Georg  
*Extension of Sliding Mode Observer for Fault Reconstruction: Comparison between LPV and Takagi-Sugeno model approach*
- 09:30 Luise Senkel, Andreas Rauh and Harald Aschemann  
*Experimental Validation of State and Parameter Estimation using Sliding-Mode Techniques with Bounded and Stochastic Uncertainty*
- 10:00 Andreas Rauh, Luise Senkel and Harald Aschemann  
*Interval-Based Sliding Mode Control for High-Temperature Fuel Cells under Actuator Constraints*

10:30 – 11:00 Coffee Break

11:00 - 12:00 **Plenary Lecture**

**Andrea Ferrari**

TBA

**Monday 9 June, 12:00 – 13:00**

Main Conference Room - Ettore Majorana Room: MS 17

Nicole Marheineke

**Tailored Mathematics for the Technical Textile Industry**

12:00 Joachim Binnig

*The Airlay Process: Basic Principles and Challenges for Tomorrow*

12:30 Simone Gramsch, Raimund Wegener and Andre Schmeißer

*Simulation of Fiber Dynamics and Fiber-Wall Contacts for Airlay Processes*

Conference Room 1 - Luigi Pirandello Room: MS 31

Andreas Bartel and Sebastian Schöps

**Minisymposium: Simulation, Model Order Reduction and Robust Optimization for Industrial E-Mobility Applications**

12:00 Oliver Lass

*Parameter identification for nonlinear elliptic-parabolic systems with application in lithium-ion battery modeling*

12:30 Alessandro Alla and Michael Hinze

*HJB-POD feedback control for Navier-Stokes equations.*

Conference Room 2 - Salvatore Quasimodo Room: MS 2

Ana Carpio

**Imaging and inverse problems**

12:00 B. Tomas Johansson

*Source reconstruction from final data in the heat equation*

12:30 Susana Serna and Antonio Marquina

*The regularized split Bregman method based on rational approximations of the absolute value function for total variation image restoration*

Conference Room 3 - Vincenzo Bellini Room: MS 24

Alessandra Micheletti

**Shape and Size in Biomedicine, Industry and Materials Science: an ECMI Special Interest Group**

12:00 Sergei Zuyev

*Optimisation on measures with applications to material design and telecommunications*

12:30 Alessio Angelo Alessi, Vincenzo Capasso, Davide Grimaldi, Alessandra Micheletti, Daniela Morale, Junichi Nakagawa and Elena Villa

*Mathematical morphology applied to the study of dual phase steel formation*

Conference Room 4 - Giovanni Verga Room: MS 22

Matti Heilio, Fahima Nekka, Jun Li, Matylda Jablonska-Sabuka and Marco Veneroni

**The Emerging Discipline of Pharmacometrics : At the Crossroad of Mathematics and Modern Pharmaceutical Sciences**

12:00 Matylda Jablonska-Sabuka, Hasifa Nampala and Matti Heilio

*Drug dose optimization in HIV treatment*

12:30 Fahima Nekka and Jun Li

*Old Problems, New Solutions: Variability and Nonlinearity in Biopharmaceutical Processes and Mathematical Model-Based Problem Solving*

Belvedere Room - Archimede Room: MS 1

José María Gambi, Michael M. Tung and Manuel Carretero

**Spacetime Models of Gravity in Geolocation and Acoustics**

12:00 Jose Maria Gambi, Michael M. Tung, Javier Clares and Maria Luisa Garcia Del Pino

*Post-Newtonian Effects in Geolocation by FDOA*

12:30 Michael M. Tung, José María Gambi and María Luisa García Del Pino

*Maxwell's Fish-Eye in (2+1)D Spacetime Acoustics*

13:00 – 14:30 Lunch

14:30 – 15:30 **Plenary Lecture**

Hermes Gadelha and **Philip Maini**

*Modelling collective cell movement in biology*

**Monday 9 June, 15:30 - 16:30**

Main Conference Room - Ettore Majorana Room: MS 17

Nicole Marheineke

**Tailored Mathematics for the Technical Textile Industry**

15:30 Christian Nessler

*Construction of artificial non-wovens*

15:50 Christoph Strohmeyer and Günter Leugering

*Effective Mechanical Properties of Nonwovens Produced by Airlay Processes*

16:10 Stephan Martin

*Higher-order averaging of linear Fokker-Planck equations for fiber dynamics*

Conference Room 1 - Luigi Pirandello Room: MS 31

Andreas Bartel and Sebastian Schöps

**Minisymposium: Simulation, Model Order Reduction and Robust Optimization for Industrial E-Mobility Applications**

15:30 Zeger Bontinck, Herbert De Gersem and Sebastian Schoeps

*Uncertainty Quantification of geometric and material properties of permanent magnetic synchronous machines*

16:00 Kai Gausling and Andreas Bartel

*Analysis of the Contraction-Condition in the Co-Simulation of a Specific Electric Circuit*

Conference Room 2 - Salvatore Quasimodo Room: MS 2

Ana Carpio

**Imaging and inverse problems**

15:30 Eduardo X. Miqueles and Elias S. Helou

*Fast Backprojection Operator for Synchrotron Tomographic Data*

Conference Room 3 - Vincenzo Bellini Room: MS 24

Alessandra Micheletti

**Shape and Size in Biomedicine, Industry and Materials Science: an ECMI Special Interest Group**

15:30 Andrea Pietrasanta, Dominique Jeulin, François Willot, Florent Moreau, Loïc Sorbier and Maxime Moreaud

*Mathematical Morphology of mesoporous alumina: design of a 3D random set model from TEM micrographs*

16:00 Katharina Losch, Frank Balle, Katja Schladitz and Claudia Redenbach

*Stochastic modeling of engineering materials for prediction of spatial mechanical characteristics*

Conference Room 4 - Giovanni Verga Room: MS C

**Contributed Session**

15:30 Clément Cancès, Moustafa Ibrahim and Mazen Saad

*A nonlinear CVFE scheme for an anisotropic degenerate nonlinear Keller-Segel model*

16:00 Patanè Andrea, Santoro Andrea, Giovanni Carapezza, Vittorio Romano, Antonino La Magna and Giuseppe Nicosia

*Robust and Efficient Tandem Thin Film Silicon Solar Cells*

Belvedere Room - Archimede Room: MS 1

José María Gambi, Michael M. Tung and Manuel Carretero

**Spacetime Models of Gravity in Geolocation and Acoustics**

15:30 Jose Maria Gambi, Javier Clares and Maria Del Carmen Rodriguez Teijeiro

*Post-Newtonian Geolocation of Passive Radio Transmitters by TDOA and FDOA*

16:00 Jose Maria Gambi, Maria Luisa Garcia Del Pino and Michael M. Tung

*Post-Newtonian Orbital Equations for Fermi Frames in the Vicinity the Earth*

16:30 – 17:00 Coffee Break

**Monday 9 June, 17:00 – 19:00**

Main Conference Room - Ettore Majorana Room: MS 17

Nicole Marheineke

**Tailored Mathematics for the Technical Textile Industry**

17:00 Andrew Sageman-Furnas

*Exploring woven structures through the geometry of Chebyshev nets*

17:20 Javier Rivero-Rodriguez, Walter Arne, Miguel Perez-Saborid, Raimund Wegener and Nicole Marheineke

*Setup of viscous Cosserat rod model describing electrospinning*

17:40 Walter Arne, Javier Rivero-Rodriguez, Miguel Pérez-Saborid, Nicole Marheineke and Raimund Wegener

*Homotopy method for viscous Cosserat rod model describing electrospinning*

18:00 Stefan Schiessl, Nicole Marheineke and Raimund Wegener

*A moving mesh framework based on three parametrization layers for 1d PDEs*

18:20 Thomas Cibis and Nicole Marheineke

*Homogenization strategies for fiber curtains and bundles in air flows*

18:40 Discussion

Conference Room 1 - Luigi Pirandello Room: MS 58

Rene Pinnau, Claudia Totzeck, Jochen Kall and Stephan Martin

**Modeling and Optimization of Interacting Particle Systems**

17:00 Claudia Totzeck

*Optimal Control of Interacting Particle Systems with External Agents*

17:30 Jochen Kall

*A different perspective on Riemann problems*

18:00 Stephan Martin

*Interacting particle systems for swarming and their kinetic PDEs*

18:30 Maria Bruna and Jon Chapman

*From discrete to continuum in stochastic models of diffusion of finite-size particles*

19:00 Martin Burger, Marco Di Francesco, Peter A. Markowich and Marie-Therese Wolfram

*Mean field game approaches in pedestrian dynamics*

19:30 Drago Concetta and Romano Vittorio

*Optimal control for semiconductor diodes design based on the MEP energy-transport model*

Conference Room 2 - Salvatore Quasimodo Room: MS 53

Sebastiano Battiato, Giovanni Gallo and Filippo Stanco

**Advanced Imaging for Industrial Application**

17:00 Marco Leo, Cosimo Distante and Tommaso De Marco

*Iris Segmentation: a new strategy for real biometric applications*

17:30 Davide Moltisanti, Giovanni Maria Farinella, Sebastiano Battiato and Giovanni Giuffrida

*Web Scraping of online newspapers via Image Matching*

18:00 Sebastiano Battiato, Giovanni Maria Farinella, Antonino Furnari and Giovanni Puglisi

*A customized system for vehicle tracking and classification*

Conference Room 3 - Vincenzo Bellini Room: MS 23

Costanza Conti and Lucia Romani

**Mathematics and CAD: interactions and intersections**

17:00 Hartmut Prautzsch

*Rational Free Form Spline surfaces with Linear Transitions Maps*

17:30 Xiaodiao Chen and Weiyin Ma

*Geometric clipping methods for efficient root finding*

18:00 Tomas Sauer

*Numeric Evaluation of Geometric Continuity in CAD Systems*

18:30 Christian Arber

*The unreasonable effectiveness of Mathematics in the CAD/CAM TopSolid Software*

19:00 Costanza Conti, Lucia Romani, Virginie Uhlmann and Michael Unser

*Active contours for biomedical images based on Hermite exponential splines*

Conference Room 4 - Giovanni Verga Room: MS 10

Matti Heilio, Poul Hjorth, Seppo Pohjolainen, Elena Vázquez Cendón, Leonid Kalachev and Sergei Zuyev

**Online Industrial Mathematics**

17:00 Poul Hjorth

*KAIST-DTU joint instruction project*

17:30 Sergei Zuyev

*Statistics Virtual Learning Environment (VLE) for Engineering Students*

18:00 Seppo Pohjolainen and Jussi Kangas

*Online education for mathematical modelling*

18:30 Wojciech Okrasinski

*Mathematical modelling in a high school stimulated by the ECMI Educational Programme*

Belvedere Room - Archimede Room: MS 19

Martin Frank and Pascal Richter

**Simulation and Optimization of Solar Tower Power Plants**

17:00 Fathia Eddhibi, Almudena Ruano San José, Mahmoud Ben Amara and Amenallah Guizani

17:30 Peter Schöttl, Raymond Branke, Tom Fluri, Anna Heimsath and Peter Nitz

*Simulation of Solar Power Towers: a techno-economical approach*

18:00 Andreas Reinholz, Peter Schwarzboezl, Nils Ahlbrink and Amadeus Rong

*Heliostat aim point optimization during operation of solar tower power plants*

*Optical simulation of solar tower power plant*

18:30 Fathia Eddhibi, Almudena Ruano San José, Mahmoud Ben Amara and Amenallah Guizani

*Simulation and Optimization of Solar Tower Power Plants*

19:00 Pascal Richter, Martin Frank and Erika Ábrahám

*Multi-objective optimization of solar tower heliostat fields*

19:30 – 21:30 **Concert**

## Tuesday 10 June

**Tuesday 10 June, 08:30 – 10:30**

Main Conference Room - Ettore Majorana Room: MS 21

Piero Colli Franzone, Luca F. Pavarino and Simone Scacchi

### **Mathematical and numerical modeling of the cardiovascular system**

- 08:30 Toni Lassila, Simone Rossi, Ricardo Ruiz-Baier and Alfio Quarteroni  
*Computational simulation of heart function with an orthotropic active strain model of electromechanics*
- 09:00 Martin Weiser and Simone Scacchi  
*Spectral Deferred Correction Methods for Adaptive Electro-Mechanical Coupling in Cardiac Simulation*
- 09:30 Rolf Krause and Dorian Krause  
*A Lightweight Approach to Parallel Adaptivity - Design, Implementation, and Application in Electrophysiology*
- 10:00 Daniele Boffi, Lucia Gastaldi and Nicola Cavallini  
*Advances in the mathematical theory of the finite element immersed boundary method*

Conference Room 1 - Luigi Pirandello Room: MS 51

Giuseppe Bilotta and Alexis Hérault

### **Smoothed Particle Hydrodynamics and its applications**

- 08:30 Sudarshan Tiwari, Axel Klar and Steffen Hardt  
*Numerical simulation of wetting phenomena by a meshfree particle method*
- 09:00 Giuseppe Bilotta, Alexander Vorobyev, Alexis Hérault, Damien Violeau and Ciro Del Negro  
*SPH for the simulation of a dam-break with floating objects*
- 09:30 Eugenio Rustico, Béla Sokoray-Varga, Giuseppe Bilotta, Alexis Herault and Thomas Brudy-Zippelius  
*Full 3D numerical simulation and validation of a fish pass with GPUSPH*
- 10:00 Peep Miidla, Jüri Liiv, Aleksei Mashirin and Toomas Tenno  
*Simulation of a twisting-ball display cell*

Conference Room 2 - Salvatore Quasimodo Room: MS 29

Eduard Feireisl, Josef Malek, Vit Prusa and Petr Schill

### **Model reduction in Continuum Thermodynamics**

- 08:30 Eduard Feireisl  
*Mathematics of fluids in motion: Analysis and/or numerics*
- 09:00 Vít Průša  
*Mathematical modeling of float glass forming process*
- 09:30 Petr Schill  
*Specific application of mathematical modelling in glass technology*
- 10:00 Josef Malek  
*Thermodynamics of rate type fluid models a their applications to deformations of asphalt binders*

Conference Room 3 - Vincenzo Bellini Room: MS 6  
Tuoi Vo T.N.

### **Industrial Particle and Interface Dynamics**

- 09:00 William Lee  
*Mathematical Modelling for Stout Beer Widgets*
- 09:30 Dana Mackey, Paul O'Reilly and Izabela Naydenova  
*Optimising copying accuracy in holographic patterning*
- 10:00 Kevin Moroney, William T. Lee, Stephen B.G. O' Brien, Freek Suijver and Johan Marra  
*Mathematical Modelling of the Coffee Brewing Process*

Conference Room 4 - Giovanni Verga Room: MS 52  
Peter Elbau and Leonidas Mindrinos

### **Mathematical Methods in Photoacoustic Tomography and Optical Coherence Tomography**

- 08:30 Maitine Bergounioux  
*An optimal control problem in photoacoustic tomography*
- 09:00 Simon Arridge, Ben Cox and Tanja Tarvanien  
*Quantitative Photoacoustics*
- 09:30 Thomas Glatz, Zakaria Belhachmi and Otmar Scherzer  
*A Gradient Descent Method for Photoacoustic Imaging in Sound-Heterogeneous Media*
- 10:00 Leonidas Mindrinos, Peter Elbau and Otmar Scherzer  
*An Iterative Reconstruction Formula for Optical Coherence Tomography*

Belvedere Room - Archimede Room: MS 43  
Stefan Körkel and Alexander Badinski

### **Model Based Optimization of Industrial Processes**

- 08:30 Robert Kircheis, Stefan Körkel and Michael Rieger  
*Microbial Enhanced Oil Recovery and efficient Parameter Estimation*
- 09:00 Simeon Sauer, Robert Lee and Alexander Badinski  
*Model-based Optimization of Chemical Processes*
- 09:30 Stefan Körkel  
*A Virtual Laboratory for Nonlinear Processes*
- 10:00 Felix Jost, Stefan Körkel and Manuel Kudruss  
*Efficient Calibration of Industrial Robots*

10:30 – 11:00 Coffee Break

11:00 - 12:00 **Plenary Lecture**

**Alfio Quarteroni**

*Model order reduction for cardiovascular simulation*

**Tuesday 10 June, 12:00 – 13:00**

Main Conference Room - Ettore Majorana Room: MS 21

Piero Colli Franzone, Luca F. Pavarino and Simone Scacchi

**Mathematical and numerical modeling of the cardiovascular system**

12:00 Joakim Sundnes, Bernardo Lino de Oliveira, Simone Pezzuto, Johan Hake and Samuel Wall

*Computational models of electro-mechanical interactions in the heart*

12:30 Paola Causin, Giovanna Guidoboni, Francesca Malgaroli, Daniele Prada, Riccardo Sacco and Alon Harris

*Impact of blood flow in ocular pathologies: can mathematical and numerical modeling help preventing blindness?*

Conference Room 1 - Luigi Pirandello Room: MS 47

Sebastiano Boscarino and Giovanni Russo

**Numerical methods for stiff problems in partial differential equations and applications**

12:00 Francis Filbet, Boscarino Sebastiano and Giovanni Russo

*High Order Semi-Implicit Schemes for Time Dependent Partial Differential Equations*

12:30 Kerstin Kuepper and Martin Frank

*Asymptotic Preserving 2-D Staggered Grid Method*

Conference Room 2 - Salvatore Quasimodo Room: MS 60

Stefano Micheletti and Simona Perotto

**Multiphysics simulations with industrial applications**

12:00 Thierry Coupez, Elie Hachem, Luisa Silva and Hugues Dignonnet

*Multiphase flow computation at high Reynolds with anisotropic adaptive meshing and stabilized FE Solver*

12:30 Melania Carfagna, Filomena Iorizzo and Alfio Grillo

*Mathematical Characterization of a Heat Pipe by means of the Non-Isothermal Cahn-Hilliard Model*

Conference Room 3 - Vincenzo Bellini Room: MS 6

Tuoi Vo T.N.

**Industrial Particle and Interface Dynamics**

12:00 Tuoi Vo T.N., William Lee, Simon Kaar, Jan Hazenberg and James Power

*Modelling particle-wall interaction in dry powder inhalers*

12:30 José Ramón Fernández García, Piotr Kalita, Stanislaw Migórski, María Del Carmen Muñiz Castiñeira and Cristina Núñez García

*Numerical analysis and simulations of a mixed kinetic-diffusion model for surfactant solutions*

Conference Room 4 - Giovanni Verga Room: MS C

**Contributed Session**

12:00 Natasa Krejic, Miles Kumaresan and Sanja Loncar

*Negative Selection - a New Performance Measure for Automated Order Execution*

12:30 Wonju Jeon

*Are special functions special in aerospace industry?*

Belvedere Room - Archimede Room: MS C

**Contributed Session**

12:00 Clemens Heitzinger

*The stochastic Poisson and Poisson-Boltzmann equations applied to quantifying noise and fluctuations in nanoscale sensors*

12:30 Christoph Huck, Caren Tischendorf and Lennart Jansen

*Perturbation-analysis for pipe-networks*

13:00 – 14:30 Lunch

14:30 – 15:30 **Plenary Lecture**

**Sylvie Méléard**

*Stochastic Modeling of Darwinian Evolution in a Chemostat.*

**Tuesday 10 June, 15:30 - 16:30**

Main Conference Room - Ettore Majorana Room: MS 21

Piero Colli Franzone, Luca F. Pavarino and Simone Scacchi

**Mathematical and numerical modeling of the cardiovascular system**

15:30 Christian Vergara, Elena Faggiano, Maria Giuseppina Nestola and Fabio Nobile

*Inexact schemes for the fluid-structure interaction with application to the ascending aorta*

16:00 Naima Aissa

*Global existence of weak solutions to an angiogenesis model*

Conference Room 1 - Luigi Pirandello Room: MS 47

Sebastiano Boscarino and Giovanni Russo

**Numerical methods for stiff problems in partial differential equations and applications**

15:30 Mattia Penati, Edie Miglio, Nicola Parolini and Roberto Porcù

*Galerkin variational integrators for solid and fluids mechanics*

16:00 Juhi Jang, Fengyan Li, Jingmei Qiu and Tao Xiong

*High Order Asymptotic Preserving Discontinuous Galerkin Schemes for the BGK Equation.*

Conference Room 2 - Salvatore Quasimodo Room: MS 60

Stefano Micheletti and Simona Perotto

**Multiphysics simulations with industrial applications**

15:30 Patrick Farrell and Simon Funke

*The optimisation of tidal turbine arrays*

16:00 Timo Van Opstal and Harald Van Brummelen

*Finite-element/boundary-element coupling for inflatables*

Conference Room 3 - Vincenzo Bellini Room: MS 6

Tuoi Vo T.N.

**Industrial Particle and Interface Dynamics**

15:30 Michael Vynnycky, Sarah Mitchell, Brendan Florio and Stephen O'Brien

*Decoupling the interaction of solid and fluid mechanics in the modelling of continuous casting processes*

16:00 Brendan Florio

*The generation and interaction of convection modes in a box of a saturated porous medium*

Conference Room 4 - Giovanni Verga Room: MS 16

Anargiros I. Delis and Mario Ricchiuto

**Non-hydrostatic wave propagation with depth averaged equations: models and methods**

15:30 Jacques Sainte-Marie, Marie-Odile Bristeau, Anne Mangeney and Nicolas Seguin

*Derivation and properties of a depth-averaged Euler system.*

16:00 Argiris Delis and Maria Kazolea

*Advanced Numerical Simulation of Near-shore Processes by Extended Boussinesq-type Models on Unstructured Meshes*

Belvedere Room - Archimede Room: MS C

**Contributed Session**

15:30 Uldis Strautins

*Fiber suspension flows: simulations and existence results*

16:00 J Krishnan

*A mathematical modelling framework for elucidating the effects of drugs on solid tumours*

16:30 – 17:00 Coffee Break

**Tuesday 10 June, 17:00 – 19:00**

Main Conference Room - Ettore Majorana Room: MS 18

Peregrina Quintela Estévez and Antonino Sgalambro

**EU-MATHS-IN: a European Network of Mathematics for Industry and Innovation**

17:00 Wil Schilders

*EU-MATHS-IN: an introduction*

17:30 Hans Georg Bock

*KoMSO – the German Strategic Committee for Mathematical Modeling, Simulation and Optimization*

17:50 Peregrina Quintela and Guadalupe Parente

*math-in/ a structure to upgrade the mathematical technology transfer to industry*

18:10 Evgeny Verbitskiy

*The National Platform for Mathematics in The Netherlands and Innovation*

18:30 Antonino Sgalambro, Michiel Bertsch, Maurizio Ceseri, Roberto Natalini, Mario Santoro and Francesco Visconti

*On the Italian network of Industrial Mathematics and its future developments: Sportello Matematico per l'industria italiana*

18:50 Georges-Henri Cottet

*AMIES : the French national network to promote interactions between mathematicians and industry*

19:10 Zoltán Horváth

*An overview of HU-MATHS-IN*

19:30 Ioannis Bozas

*Mathematics and Patents: are these worlds compatible?*

Conference Room 1 - Luigi Pirandello Room: MS 36

Manuel J Castro Diaz, Carlos Parés Madroñal and Giovanni Russo

**New progress on numerical modeling of Geophysical flows for environment, natural hazards, and risk evaluation**

17:00 Alina Chertock, Michael Dudzinski, Alexander Kurganov and Maria Lukacova-Medvidova

*Well-Balanced Schemes for the Shallow Water Equations with Coriolis Force*

17:24 Enrique Fernandez-Nieto, José María Gallardo Molina and Paul Vigneaux

*Modelling and numerical approach of viscoplastic avalanches*

17:48 Marie-Odile Bristeau, Raouf Hamouda and Jacques Sainte-Marie

*Simulations of 3d Navier-Stokes equations with free surface for hydrodynamics-biology coupling and marine energies.*

18:12 Tomás Morales de Luna, Enrique D. Fernández Nieto and Manuel J. Castro Díaz

*A multilayer approach for the simulation of suspended sediment transport*

18:36 Gianni Pagnini and Andrea Mentrelli

*The randomized level set method and an associated reaction-diffusion equation to model wildland fire propagation*

Conference Room 2 - Salvatore Quasimodo Room: MS 60

Stefano Micheletti and Simona Perotto

**Multiphysics simulations with industrial applications**

- 17:00 Dimitar Iliev, Oleg Iliev, Ralf Kirsch, Zahra Lakdawala, Andro Mikelic and Galina Printsypar  
*Multiphysics and multiscale models for the simulation of filtration processes*
- 17:30 Marianna Signorini, Stefano Micheletti and Simona Perotto  
*An Optimal Control Approach to Full Waveform Inversion (FWI)*
- 18:00 Andreas Steinbrecher  
*Numerical Treatment of High Index Dynamical Systems*
- 18:30 Alfio Grillo, Raphael Prohl, Gabriel Wittum and Salvatore Federico  
*A model of structural reorganisation in statistically oriented fibre-reinforced biological materials*

Conference Room 3 - Vincenzo Bellini Room: MS 13

Sean Mcginty and Sean McKee

**Mathematical Modelling of Drug Delivery**

- 17:00 Giuseppe Pontrelli and Sean McGinty  
*Drug delivery in biological tissues: a two-layer reaction-diffusion-convection model*
- 17:30 Sean Mcginty, Sean McKee, Christopher McCormick and Marcus Wheel  
*A mathematical model for the estimation of drug binding rates in biological tissue*
- 18:00 Martin Meere and Tuoi Vo  
*Mathematical models for drug release from affinity hydrogels*
- 18:30 Jahed Naghipoor, José Ferreira and Paula De Oliveira  
*A coupled non-Fickian model of a cardiovascular drug delivery system*
- 19:00 Franz Bozsak, Francois Cornat, Jean-Marc Chomaz and Abdul Barakat  
*Optimization of Drug-Eluting Stents*

Conference Room 4 - Giovanni Verga Room: MS 16

Anargiros I. Delis and Mario Ricchiuto

**Non-hydrostatic wave propagation with depth averaged equations: models and methods**

- 17:00 Claes Eskilsson and Allan P. Engsig-Karup  
*On devising Boussinesq-type equations with bounded eigenspectra: Two horizontal dimensions*
- 17:30 Chiu-Yen Kao, Alexander Kurganov, Zhuolin Qu and Ying Wang  
*A Fast Explicit Operator Splitting Method for Modified Buckley-Leverett Equations*
- 18:00 Fabien Marche and Lannes David  
*Numerical approximation of a new family of Green-Naghdi equations*
- 18:30 Andrea Gilberto Filippini, Stevan Bellec, Mathieu Colin and Mario Ricchiuto  
*On shoaling properties of enhanced Boussinesq models*

Belvedere Room - Archimede Room: MS 35

Gilda Maria Currenti and Eugenio Sansosti  
**Numerical Methods in Volcano Geophysics**

17:00 Sebastien Court

*Fictitious domain methods for fracture models in elasticity.*

17:30 Giuseppe Nicosia, Piero Conca, Jole Costanza, Giovanni Carapezza, Gilda Currenti and  
Ciro Del Negro

*Multi-Objective Optimization, Sensitivity and Robustness Analyses for the inverse  
modeling of Ground Deformation and Gravity Changes of the 1981 Etna Eruption*

18:00 Armando Coco, Gilda Currenti, Ciro Del Negro, Joachim Gottsmann and Giovanni Russo  
*Geophysical changes in hydrothermal-volcanic areas: A Second Order Finite-Difference  
Ghost-Cell Method to solve thermo-poro-elastic equations*

## Wednesday 11 June

**Wednesday 11 June, 08:30 – 10:30**

Main Conference Room - Ettore Majorana Room: MS 18

Peregrina Quintela Estévez and Antonino Sgalambro

### **EU-MATHS-IN: European success stories with Industry part I Manufacturing and Service Management**

- 08:30 Zoltán Horváth, János Jósvai, Tamás Hajba and Sándor Kálmán  
*Scheduling of Production Lines in Automotive Factories with the Modeling, Simulation and Optimization Technology*
- 09:00 Matteo Pozzi, Daniele Vigo, Angelo Gordini, Claudio Caremi, Sandro Bosso, Giuseppe D'Aleo, Beatrice Beleggia, Valerio Vannini and Giulia Biancardi  
*SPRINT: Optimization of Staff Management for Desk Customer Relations Services at Hera*
- 09:30 Alpar Juttner  
*PROGILE - a DS8000 storage manufacturing optimization tool at IBM DSS, Hungary*
- 10:00 Stephen O'Brien, William Lee and Joanna Mason  
*Setting up an industrial mathematics network and study groups in Ireland*

Conference Room 1 - Luigi Pirandello Room: MS 260

Antonino La Magna

### **Ab-initio based Kinetic and Transport Models**

- 08:30 I. Deretzis and Antonino La Magna  
*Kinetic Monte Carlo simulations of graphene on SiC processes*
- 08:45 I. Deretzis, G. Calogero, G.G.N. Angilella and Antonino La Magna  
*Electron structure and quantum transport in disordered graphene*
- 09:00 Luciano Colombo Department of Physics, University of Cagliari (Italy)  
*Calculating lattice thermal conductivity in solids by atomistic simulations*
- 09:30 Stefan Goedecker  
*Theoretical structure prediction*
- 10:00 Fabrizio Cleri, Guillaume Copie, Cristhophe Krzeminski and Bruno Grandidier  
*Should molecular lattices always be the most densely packed ?*

Conference Room 2 - Salvatore Quasimodo Room: MS 88

Tim Myers and Luis Bonilla

### **Mathematics in Nanotechnology**

- 08:30 Ana Carpio, David Rodriguez and Baldvin Einarsson  
*Dynamics of bacterial aggregates in microflows*
- 09:00 M. Alvaro, L.L. Bonilla and M. Carretero  
*Dynamics of optically injected currents in carbon nanotubes*
- 09:30 Francesc Font Martinez and Tim Myers  
*Mathematical model for the melting of a nano-thin film*
- 10:00 Tim Myers and Michelle MacDevette  
*Boundary layer analysis and heat transfer of a nanofluid*

Conference Room 3 - Vincenzo Bellini Room: MS 61

Caren Tischendorf

**Simulation Issues for Nanoelectronic Coupled Problems**

- 08:30 Rick Janssen, Jan Ter Maten and Caren Tischendorf  
*The European Project nanoCOPS for Nanoelectronic Coupled Problems Solutions*
- 08:55 Wim Schoenmaker, Olivier Dupuis, Bart De Smedt and Peter Meuris  
*Fully-Coupled Electro-Thermal Power Device Fields*
- 09:20 David Duque Guerra and Sebastian Schöps  
*Fast and Reliable Simulations of the Heating of Bond Wires*
- 09:45 Lihong Feng, Athanasios C. Antoulas and Peter Benner  
*Automatic generation of reduced order models for linear parametric systems*
- 10:10 Caren Tischendorf  
*Dynamic Coupled Electromagnetic Field Circuit Simulation*

Conference Room 4 - Giovanni Verga Room: MS 14

Hilary Ockendon

**European Study Groups with Industry**

- 08:30 Stephen O'Brien, William Lee and Joanna Mason  
*Study Groups in Ireland*
- 09:00 Andreas Muench  
*Two Industry Workshops in Berlin*
- 09:30 Adérito Araújo  
*European Study Groups with Industry the portuguese experience*
- 10:00 Isabel Cristina Lopes, Eliana Costa E Silva, Manuel Cruz and Ana Moura  
*A Mathematical Model for Supermarket Order Picking*

Belvedere Room - Archimede Room: MS 20

Ian Griffiths

**The Collaborative Workshop Initiative: The intersection of theoretical and experimental industrial science**

- 08:30 Ian Griffiths  
*The Collaborative Workshop Initiative: The intersection of theoretical and experimental industrial science*
- 09:00 Jon Chapman, Naima Hammoud, Philippe Trinh, Hyoungsoo Kim, Peter Howell, Howard A. Stone  
*Curvature suppresses the Rayleigh-Taylor instability.*
- 09:30 Daniele Vigolo, Ian M. Griffiths, Stefan Radl and Howard A. Stone  
*An experimental and theoretical investigation of particle-wall impacts in a T-junction*
- 10:00 Guy Z. Ramon, Ian Griffiths and Robert Field  
*Dynamics of pulse propagation during osmosis-assisted cleaning of composite membranes*

10:30 – 11:00 Coffee Break

11:00 - 12:00 Plenary Lecture

**Manuel J. Castro Diaz**

*Uncertainty quantification by Multi-level Monte Carlo finite volume method: application to geophysical flows*

**Wednesday 11 June, 12:00 – 13:00**

Main Conference Room - Ettore Majorana Room: MS 18

Peregrina Quintela Estévez and Antonino Sgalambro

**EU-MATHS-IN: European success stories with Industry part II**  
**Traffic Management and Sustainable Energy**

12:00 Ekaterina Kostina

*Direct Optimal Control Methods for a Centralized Approach to Separation Management*

12:30 Gamboa Fabrice, Goudal Philippe and Loubes Jean-Michel

*Random Models for Road Traffic : a graph perspective*

Conference Room 1 - Luigi Pirandello Room: MS 28

Francesco Ferranti and Wil Schilders

**Parameterized model order reduction methods for complex multidimensional systems**

12:00 Yao Yue, Suzhou Li, Lihong Feng, Andreas Seidel-Morgenstern and Peter Benner

*Accelerating uncertainty quantification of linear simulated moving bed chromatography models by Krylov-type (parametric) model order reduction methods*

12:30 Domenico Spina, Francesco Ferranti, Tom Dhaene, Luc Knockaert and Giulio Antonini

*Polynomial Chaos and Model Order Reduction for Efficient Variability Analysis*

Conference Room 2 - Salvatore Quasimodo Room: MS 62

Michael Günther

**Multiphysics simulation in electrical engineering**

12:00 Johanna Kerler and Tatjana Stykel

*Nonlinear model reduction for simulation of coupled systems*

12:30 Lennart Jansen

*Exponential integration methods for water transportation networks*

Conference Room 3 - Vincenzo Bellini Room: MS 27

Mariano Alvaro, Luis Bonilla, Orazio Muscato and Vittorio Romano

**Semiclassical and quantum transport in semiconductors and low dimensional materials**

12:00 Wolfgang Wagner

*Heat generation in the electrothermal Monte Carlo method*

12:30 Valentina Tozzini, Dario Camiola, Riccardo Farchioni, Antonio Rossi, Tommaso Cavallucci and Vittorio Pellegrini

*Multi-Scale Simulations of Rippled Hydrogenated Graphene*

Conference Room 4 - Giovanni Verga Room: MS 14

Hilary Ockendon

**European Study Groups with Industry**

12:00 Poul Hjorth

*A Flying Corps of Applied Mathematicians*

12:20 Stefka Dimova

*ESGI95 – the first Study Group with Industry in Bulgaria*

12:40 Charles Holland and Hilary Ockendon

*Discussion Session*

Belvedere Room - Archimede Room: MS 20

Ian Griffiths

**The Collaborative Workshop Initiative: The intersection of theoretical and experimental industrial science**

12:00 Maria Bruna and Guy Z. Ramon

*Modelling transport through composite membranes: geometry effects*

12:30 Stephen Wilson, Phil Trinh and Howard Stone

*The "Contact Lens Problem"*

13:00 – 14:30 Lunch

**Wednesday 11 June, 14:30 - 15:30**

Main Conference Room - Ettore Majorana Room: MS 18

Peregrina Quintela Estévez and Antonino Sgalambro

**EU-MATHS-IN: European success stories with Industry part II  
Traffic Management and Sustainable Energy**

14:30 Emilio Carrizosa, Carmen Ana Dominguez-Bravo, Enrique Fernandez-Cara and Manuel Quero

*Optimal design of Solar Power Tower systems*

15:00 David Aller, Alfredo Bermudez, Maria Teresa Cao-Rial, Pedro Fontan, Francisco Pena, Andres Prieto, Jeronimo Rodriguez and Jose Francisco Rodriguez-Calo

*Automatic analysis of floating offshore structures*

Conference Room 1 - Luigi Pirandello Room: MS 28

Francesco Ferranti and Wil Schilders

**Parameterized model order reduction methods for complex multidimensional systems**

14:30 Massimiliano Lupo Pasini, Simona Perotto and Alessandro Veneziani

*Hi-Mod reduction driven by a POD strategy*

15:00 Laura Iapichino, Alfio Quarteroni, Gianluigi Rozza and Stefan Volkwein

*Reduced basis method and domain decomposition for viscous flows in parametrized complex networks*

Conference Room 2 - Salvatore Quasimodo Room: MS 62

Michael Günther

**Multiphysics simulation in electrical engineering**

14:30 Christoph Hachtel, Michael Günther and Andreas Bartel

*Model Order Reduction for Multirate ODE-Solvers in Multiphysics Application*

15:00 Valentina Koliskina, Andrei Kolyshkin, Olev Martens, Rauno Gordon, Raul Land and Andrei Pokatilov

*Eddy current model for non-destructive testing of electrically conducting materials with cylindrical symmetry*

Conference Room 3 - Vincenzo Bellini Room: MS 27

Mariano Alvaro, Luis Bonilla, Orazio Muscato and Vittorio Romano

**Semiclassical and quantum transport in semiconductors and low dimensional materials**

14:30 M. Alvaro, L.L. Bonilla and M. Carretero

*Modulated Bloch waves in semiconductor superlattices*

15:00 Luis Bonilla, Mariano Alvaro and Manuel Carretero

*Spontaneous chaos, random number generators and electron transport in multi-quantum wells at room temperature*

Conference Room 4 - Giovanni Verga Room: MS 10

Matti Heilio, Poul Hjorth, Seppo Pohjolainen, Elena Vázquez Cendón, Leonid Kalachev and Sergei Zuyev

**Online Industrial Mathematics**

14:30 Matti Heilio

*Towards a European Net Campus for Industrial Mathematics*

15:00 Leonid Kalachev and Heikki Haario

*Dual Delivery Courses and the Future of Online Industrial Mathematic*

15:30 – 16:00 Coffee Break

**Wednesday 11 June , 16:00 – 19:00**

Main Conference Room - Ettore Majorana Room: MS 18

Peregrina Quintela Estévez and Antonino Sgalambro

**EU-MATHS-IN: European success stories with Industry part III**

## **Biomedical Imaging, Electronics and Telecommunications**

- 16:00 Vittoria Bruni, Raino Ceccarelli, Vincenzo Ricco and Domenico Vitulano  
*Efficient Image Processing Tools for Confocal Microscopy: A Case Study*
- 16:30 Peter Maass  
*MALDI Imaging: Sparsity concepts for analyzing and visualizing metabolic information*
- 17:00 Antoine Girard, Pierre Lebeaut, Roland Hildebrand, Nicolas Peltier and Sylvian Kaiser  
*MaiMoSiNE / DOCEA Power: Assessing the quality of reduced order models of heat transfer in electronic devices*
- 17:30 Dee Denteneer  
*Mathematical models for wireless mesh networks*
- 18:00 Wil Schilders  
*Model order reduction within the electronics industry*
- 18:30 *Final Discussion*

Conference Room 1 - Luigi Pirandello Room: MS 30

Dragica Vasileska

### **Selected Topics in Semi-Classical and Quantum Transport Modeling**

- 16:00 Massimo Fischetti  
*Pseudopotential-based study of electron transport in low-dimensionality nanostructures*
- 16:30 Neophytos Neophytou and Hans Kosina  
*Full-Band Calculations of Thermoelectric Properties of Si Nanowires and Thin Layers*
- 17:00 Dmitri Osintsev, Viktor Sverdlov and Siegfried Selberherr  
*Electron Momentum and Spin Relaxation in Silicon Films*
- 17:30 Philippe Dollfus, Viet Hung Nguyen, Salim Berrada, Van Truong Tran, Mai Chung Nguyen, Arnaud Bournel and Jérôme Saint-Martin  
*Strategies to improve the control of current in graphene transistors*

### **Contributed talk**

- 18:00 Marco Veneroni  
*Analysis of a variational model for liquid crystal shells*

Conference Room 2 - Salvatore Quasimodo Room: MS 28

Francesco Ferranti and Wil Schilders

### **Parameterized model order reduction methods for complex multidimensional systems**

- 16:00 Luca Daniel  
*Accelerating Optimization, Inverse Problems & Uncertainty Quantification on Complex Systems via Parameterized Model Order Reduction*
- 16:30 Olivier Maury  
*The use of Parameterized Cells in EDA softwares*
- 17:00 Wil Schilders  
*EU-MORNET: European Model Reduction Network*

Conference Room 3 - Vincenzo Bellini Room: MS 33

Giuseppe Alì and Giovanni Mascali

### **Mathematical Problems from Semiconductor Industry**

- 16:00 Roland Pulch, Andreas Bartel and Sebastian Schöps  
*Quadrature methods with adjusted grids for stochastic models of coupled problems*
- 16:30 Bratislav Tasic, Jos J. Dohmen, E Jan W Ter Maten, Theo G.J. Beelen and Wil H.A. Schilders  
*Fast Fault Simulation to identify subcircuits involving faulty components*
- 17:00 Paolo G. Ferrandi, Stefano Micheletti and Paolo Simioni  
*Charge transport in OLETs: mathematical model and numerical simulations*
- 17:30 Alfio Borzi and Gabriele Ciaramella  
*Newton methods for the optimal control of closed quantum spin systems*
- 18:00 Giuseppe Ali, Banagaaya Nicodemus and Schilders W.H.A.  
*Index-aware Model Order Reduction methods for electrical networks*
- 18:30 Michael Günther, Christof Hachtel and Adrian Sandu  
*Multirate GARK schemes for coupled problems*

Conference Room 4 - Giovanni Verga Room: MS 40

Andreas Muench and Barbara Wagner

### **Mathematical Modelling of Photovoltaic Devices**

- 16:00 Victor Burlakov, Samuel Stranks, Tomas Leijtens, James Ball, Henry Snaith and Alain Goriely  
*Understanding Photoluminescent properties of Organolead Halide Perovskite*
- 16:30 Matthew Hennessy, Victor Burlakov, Andreas Münch, Barbara Wagner and Alain Goriely  
*Controlled topological transformations in a binary mixture confined to a thin-film geometry*
- 17:00 Jonathan Black, Christopher Breward, Peter Howell and Gareth Fuge  
*Mathematical modelling of contact resistance in silicon photovoltaic cells*
- 17:30 Tobias Ahnert, Andreas Münch and Barbara Wagner  
*Two-phase flow model for suspensions with yield-stress behavior*

Belvedere Room - Archimede Room: MS 4

Matthias Ehrhardt, Jörg Kienitz and Jan Ter Maten

### **Computational Finance**

- 16:00 Alfio Borzi  
*A Fokker-Planck Strategy to Control Stochastic Processes*
- 16:30 Rubén Figueroa and Maria Do Rosário Grossinho  
*A class of nonlinear boundary value problems for a Black-Scholes type equation*
- 17:00 Christoph Reisinger  
*Numerical solution of stochastic PDEs arising in financial engineering*
- 17:30 Ana María Ferreiro Ferreiro, José Antonio García Rodríguez, José Germán López Salas and Carlos Vázquez Cendón  
*Efficient calibration and pricing in LIBOR Market Models with SABR stochastic volatility using GPUs*

### **Contributed talk**

- 18:00 Youssef El-Khatib and Abdunasser Hatemi-J  
*An Alternative Stochastic Volatility Model*

## Thursday 12 June

Thursday 12 June, 08:30 – 10:30

Main Conference Room - Ettore Majorana Room: MS 30

Dragica Vasileska

### **Selected Topics in Semi-Classical and Quantum Transport Modeling**

- 08:30 Ivan Dimov, Mihail Nedjalkov, Jean Michel Sellier and Siegfried Selberherr  
*Neumann Series Analysis of the Wigner Equation Solution*
- 09:00 Salvatore Maria Amoroso, Louis Gerrer, Vihar Georgiev and Asen Asenov  
*Simulation of oxide reliability of nanoscaled MOSFETs using drift-diffusion, Monte Carlo and full-quantum techniques*
- 09:30 Zlatan Stanojevic, Lidija Filipovic, Oskar Baumgartner, Markus Karner, Christian Kernstock and Hans Kosina  
*Advanced Numerical Methods for Semiclassical Transport Simulation in Ultra-Narrow Channels*
- 10:00 Daniel Brinkman, Klemens Fellner and Peter Markowich  
*Drift-Diffusion Models for Organic Photovoltaics: Deriving a Unipolar Model*

Conference Room 1 - Luigi Pirandello Room: MS 8

Salvatore Rinaudo, Giuliana Gangemi, Mohamed Ali Khozoei, Patrick Lang, Zia Abbas, Vittorio Latorre, Gianni Di Pillo, Carlo Roma, Carmelo Vicari, Angelo Ciccazzo, Helmut

### **Methods for Advanced Multi-Objective Optimization for eDFY of complex Nano-scale Circuits**

- 08:30 Helmut Graeb  
*How to include Pareto front computation, discrete parameter values and aging into analog circuit sizing*
- 09:00 Vittorio Latorre, Gianni Di Pillo and Angelo Ciccazzo  
*Yield Optimization in Electronic Circuits Design*
- 09:30 Zia Abbas and Mauro Olivieri  
*Application of mathematical methods to the modeling and optimization of logic cell performance*
- 10:00 Patrick Lang, Matthias Hauser and Mohammed Ali Khozoei  
*The usage of Symbolic Model Order Reduction techniques for reducing the complexity of a system of differential-algebraic equations describing the behaviour of an integrated circuit, thus reducing drastically the simulation time*

Conference Room 2 - Salvatore Quasimodo Room: MS 12

Adérito Araújo and Sílvia Barbeiro

### **Mathematical methods in medical imaging**

- 08:30 Karol Mikula  
*Tracking cells in 4D biomedical images*
- 08:55 Tobias Preusser  
*Considering uncertain data in PDE based medical image processing*
- 09:20 Pedro Serranho, Pedro Rodrigues, Pedro Guimarães and Rui Bernardes  
*Retinal vascular network in 3D from optical coherence tomography data*

- 09:45 Eduardo Cuesta and Angel Durán  
*Non-local evolutionary models and its applications to medical images*
- 10:10 Sílvia Barbeiro, Adérito Araújo and Pedro Serranho  
*Semi-implicit finite difference schemes for nonlinear complex diffusion processes*

Conference Room 3 - Vincenzo Bellini Room: MS 39

Maria Bruna and Barbara Wagner

**Models of drift-diffusion for concentrated solutions**

- 08:30 Manuel Landstorfer, Clemens Gohlke and Wolfgang Dreyer  
*A new continuum mixture theory of electrolytic solutions containing solvation effects*
- 09:00 Martin Burger, Baerbel Schlake and Marie-Therese Wolfram  
*Nonlinear Poisson-Nernst-Planck Equations for ion flux through confined geometries*
- 09:30 Jon Chapman and Maria Bruna  
*Excluded volume effects in drift diffusion*
- 10:00 Adrien Bizeray, Stephen Duncan and David Howey  
*Physics-based modelling of lithium-ion batteries using orthogonal collocation*

Conference Room 4 - Giovanni Verga Room: MS 4

Matthias Ehrhardt, Jörg Kienitz and Jan Ter Maten

**Computational Finance**

- 08:30 Christof Heuer  
*High-order compact finite difference schemes for parabolic differential equations with mixed derivative terms in  $n$  space dimensions and application to basket options*
- 09:00 Cornelis W. Oosterlee, Marta Pou and Marjon J. Ruijter  
*Extension of a Fourier-cosine method to solve BSDEs with higher dimensions*
- 09:30 Chiara Guardasoni  
*A boundary element method for pricing barriers options*
- 10:00 Long Teng, Matthias Ehrhardt and Michael Günther  
*Modelling Stochastic Correlation*

Belvedere Room - Archimede Room: MS C

**Contributed Session**

- 08:30 Schehrazad Selmane  
*The Impact of Chemoprophylaxis and Isolation on Tuberculosis Incidence*
- 09:00 Pasqua D'Ambra and Panayot S. Vassilevski  
 *$\alpha$ AMG based on Weighted Matching for Systems of Elliptic PDEs arising from Displacement and Mixed Methods*
- 09:30 Filippo Notarnicola  
*Mathematical Formulation of Bioventing Optimal Design Strategies*
- 10:00 Raimondas Ciegis  
*Numerical simulation of heat transfer in underground electrical cables*

10:30 – 11:00 Coffee Break

11:00 - 12:00 **Plenary Lecture**

**Dragica Vasileska**

TBA

**Thursday 12 June, 12:00 – 13:00**

Main Conference Room - Ettore Majorana Room: MS 27

Mariano Alvaro, Luis Bonilla, Orazio Muscato and Vittorio Romano

**Semiclassical and quantum transport in semiconductors and low dimensional materials**

12:00 Manuel Carretero, Mariano Alvaro and Luis Bonilla

*Characterizing spontaneous chaos in semiconductor multi-quantum wells at room temperature*

12:30 Luigi Barletti

*Derivation of a hydrodynamic model for electron transport in graphene via entropy maximization*

Conference Room 1 - Luigi Pirandello Room: MS 8

Salvatore Rinaudo, Giuliana Gangemi, Mohamed Ali Khozoei, Patrick Lang, Zia Abbas, Vittorio Latorre, Gianni Di Pillo, Carlo Roma, Carmelo Vicari, Angelo Ciccazzo, Helmut

**Methods for Advanced Multi-Objective Optimization for eDFY of complex Nano-scale Circuits**

12:00 Carmelo Vicari, Mohammed Ali Khozoei, Zia Abbas and Mauro Olivieri

*Statistical Variation Aware ANN and SVM Model Generation for Digital Standard Cells*

12:30 Mohammed Ali Khozoei, Angelo Ciccazzo and Matthias Hauser

*Waveform modelling in order to speed up transient SPICE simulations*

Conference Room 2 - Salvatore Quasimodo Room: MS 32

Marco Donatelli and Stefano Serra Capizzano

**Structured Numerical Linear Algebra in Imaging and Monument conservation**

12:00 Alessandro Buccini and Marco Donatelli

*Multigrid Regularization Method for image deblurring with arbitrary boundary conditions*

12:30 Daniele Bertaccini

*Updating preconditioners in digital image restoration*

Conference Room 3 - Vincenzo Bellini Room: MS 48

Patrizia Daniele

**Recent advances on equilibrium problems with applications to networks**

12:00 Patrizia Daniele, Fuminori Toyasaki and Tina Wakolbinger

*A Variational Inequality Formulation of Equilibrium Models for End-of-Life Products with Nonlinear Constraints*

12:30 Anna Nagurney, Min Yu, Jonas Floden and Ladimer Nagurney

*Supply Chain Network Competition in Time-Sensitive Markets*

Conference Room 4 - Giovanni Verga Room: MS 4  
Matthias Ehrhardt, Jörg Kienitz and Jan Ter Maten

**Computational Finance**

12:00 Zuzana Buckova, Matthias Ehrhardt and Michael Guenther

*Fichera Theory and its Application in Finance*

12:30 Pedro Pólvara

*Derivative pricing under transaction costs using a stochastic utility maximization model*

Belvedere Room - Archimede Room: MS C

**Contributed Session**

12:00 Sam Subbey, Benjamin Planque, Ulf Lindstroem and Anna Frank

*Approximate Uncertainty Quantification Using Vague Knowledge*

12:30 Sam Subbey, Hans Skaug and Lennart Frimannslund

*Tracking Uncertainty Propagation in a Fisheries Population Dynamics Model*

13:00 – 14:30 Lunch

14:30 – 15:30 **Plenary Lecture**

**Olivier Maury**

*Mathematics applied to Analog Circuit Simulation*

**Thursday 12 June, 15:30 - 16:30**

***Anile-ECMI prize***

16:30 – 17:00 Coffee Break

**Thursday 12 June, 17:00 – 18:00**

Main Conference Room - Ettore Majorana Room: MS 27

Mariano Alvaro, Luis Bonilla, Orazio Muscato and Vittorio Romano

**Semiclassical and quantum transport in semiconductors and low dimensional materials**

17:00 Armando Majorana and Vittorio Romano

*Deterministic solutions of the transport equation for charge carrier in graphene*

17:30 V. Dario Camiola and Vittorio Romano

*Hydrodynamic model for charge transport in graphene*

18:00 Paola Pietra and Clement Jourdana

*Modeling and simulation of electron transport in a CNTFET*

18:30 Davide Cagnoni, Marco Bellini, Jan Vobecký, Marco Restelli and Carlo de Falco

*Mixed Mode TCAD for Large Scale Power Electronics Devices*

Conference Room 1 - Luigi Pirandello Room: MS 8

Salvatore Rinaudo, Giuliana Gangemi, Mohamed Ali Khozoei, Patrick Lang, Zia Abbas, Vittorio Latorre, Gianni Di Pillo, Carlo Roma, Carmelo Vicari, Angelo Ciccazzo, Helmut

**Methods for Advanced Multi-Objective Optimization for eDFY of complex Nano-scale Circuits**

17:00 Stefano Lucidi, Gianni Fasano, Giampaolo Liuzzi and Francesco Rinaldi

*Derivative-free methods for multiobjective Lipschitz problems*

17:30 Giuliana Gangemi, Carmelo Vicari, Angelo Ciccazzo and Salvatore Rinaudo

*The MAnON Project: Methods for Advanced Multi-Objective Optimization for eDFY of complex Nano-scale Circuits*

Conference Room 2 - Salvatore Quasimodo Room: MS 32

Marco Donatelli and Stefano Serra Capizzano

**Structured Numerical Linear Algebra in Imaging and Monument conservation**

17:00 Thomas Huckle

*Data based regularization methods*

17:30 Marco Donatelli, Matteo Semplice and Stefano Serra-Capizzano

*Multigrid preconditioning for nonlinear (degenerate) parabolic equations with application to monument degradation*

18:00 Fabrizio Clarelli, Barbara De Filippo and Roberto Natalini

*A free-boundary model of corrosion*

18:30 Armando Coco, Marco Donatelli and Matteo Semplice

*Numerical methods for nonlinear PDEs modeling monument preservation*

Conference Room 3 - Vincenzo Bellini Room: MS 48

Patrizia Daniele

**Recent advances on equilibrium problems with applications to networks**

17:00 Tina Wakolbinger, Fuminori Toyasaki, Thomas Nowak and Anna Nagurney

*When and for whom would e-waste be a treasure trove? Insights from a network equilibrium*

17:30 Fabio Raciti

*Nash equilibrium problems with uncertain data*

Conference Room 4 - Giovanni Verga Room: MS 4

Matthias Ehrhardt, Jörg Kienitz and Jan Ter Maten

**Computational Finance**

17:00 Rafael Company, Vera Egorova and Lucas Jódar

*A Positive, stable and consistent front-fixing numerical scheme for American Options*

17:30 Walter Mudzimbabwe

*An efficient Monte Carlo algorithm for pricing arithmetic Asian options under a jump diffusion process.*

Belvedere Room - Archimede Room: MS C

**Contributed Session**

17:00 Jukka-Pekka Humaloja, Timo Hämäläinen and Seppo Pohjolainen

*On Detecting the Shape of an Unknown Object in an Electric Field*

17:30 Ivan Martynov and Tuomo Kauranne

*Detection of Shadow Artifacts in Satellite Imagery Using Digital Elevation Models*

18:00 – 19:00 **Poster session**

Roumiana Antonova, Dobrinka Stefanova, Galia Novakova, Dimitar Birov, Ingo Bremer and Kamen Spassov

*The Platform Design Model of SAP HANA in the Cloud*

Grzegorz Domek and Marian Dudziak

*Mathematical description of timing belt's motion in the process of coupling*

Grzegorz Domek and Marian Dudziak

*New approach to description of friction in the gear with timing belt*

Winston Sweatman, Haydn Cooper, Philip Kilby and Graeme Wake

*Influence diagrams to aid decision making*

Chang Wang

*Stochastic Butler-Volmer dynamics in modelling lithium-ion battery electrodes*

Jacek Krocak and Marian Dudziak

*Axial load distribution of contact stresses in involute splined connections*

## Friday 13 June

### Friday 13 June, 08:30 – 10:30

Main Conference Room - Ettore Majorana Room: MS 4

Matthias Ehrhardt, Jörg Kienitz and Jan Ter Maten

#### **Computational Finance**

08:30 Nicola Cantarutti

*Option pricing in exponential Lévy models with transaction costs.*

09:00 Ivan Yamshchikov, Ljudmila Bordag and Dmitry Zhelezov

*Portfolio optimization in the case of an asset with a given liquidation time distribution*

09:30 Lara Trussardi and Ansgar Jüngel

*Analysis of a cross-diffusion herding model in social economics*

10:00 Mohamed El Fakharany, Rafael Company and Lucas Jódar

*Numerical Solution of Partial-Integro Differential Option Pricing Models with Cross Derivative term*

Conference Room 1 - Luigi Pirandello Room: MS 63

Claudio Albanese

#### **Current Challenges in Computational Finance**

08:30 Giacomo Pietronero

*Finite difference methods with third level algebra*

09:00 Claudio Albanese and Giacomo Pietronero

*Portfolio simulations for the “mega-models”*

09:30 Paolo Regondi, Claudio Albanese and Mohammad Zubair

*Speeding Algebraic Pricing Methods using Matrix Operations on GPU*

10:00 Sebastian Del Bano Rollin, Claudio Albanese and Giacomo Pietronero

*Probabilistic interpretation of finite difference methods*

Conference Room 2 - Salvatore Quasimodo Room: MS 37

Dietmar Hoemberg and Thomas Petzold

#### **Recent trends in modeling, analysis, and simulation of induction heat treatments**

08:30 Pierre-Etienne Druet

*Optimisation of crystal growth from the melt using magnetic fields: some mathematical aspects*

09:00 Thomas Petzold

*Modelling and Simulation of Multifrequency Induction Hardening for Gear Components*

09:30 Alfred Schmidt, Qingzhe Liu and Jonathan Montalvo Urquizo

*Modelling and Simulation of the Thermomechanics of Induction Heat Treatment*

10:00 María Teresa González Montesinos and Francisco Ortegón Gallego

*Analysis of potential Maxwell's equations in the harmonic regime with nonuniformly elliptic electric conductivity*

Conference Room 3 - Vincenzo Bellini Room: MS 11

Gerd Steinebach, Oliver Kolb and Jens Lang

**Simulation and Optimization of water and gas networks**

08:30 Tanja Clees, Kläre Cassirer, Bernhard Klaaßen, Igor Nikitin and Lialia Nikitina

*Simulation and analysis of gas networks with MYNTS*

09:00 Oliver Kolb, Jens Lang, Pia Domschke, Alexander Martin, Björn Geißler and Antonio Morsi

*Combination of Linear and Nonlinear Programming Techniques for Optimization Problems in Gas and Water Supply Networks*

09:30 Raul Borsche

*High order schemes on networks of conservation laws*

10:00 Jens Lang, Pia Domschke and Oliver Kolb

*Adaptive Modelling, Simulation and Optimization of Water and Gas Supply Networks*

Conference Room 4 - Giovanni Verga Room: MS 25

Jose' Maria Gambi Fernandez and Alessandra Micheletti

**Success stories from the ECMI Educational Programme**

08:30 Eddie Wilson

*Breadth-First vs Depth-First in Industrial Mathematics Education*

09:00 Nicole Marheineke

*Theo-Prac Projects with Industry*

09:30 Filippo Terragni

*Benefits of ECMI education in mathematical modeling: a personal reflection*

10:00 Alfredo Bermúdez, M. Elena Vázquez-Cendón, Carlos Vázquez, José Durany, Luis Bonilla and José M. Vega

*Master in Industrial mathematics (M2i): An experience with cross-institutional education in industrial mathematics*

Belvedere Room - Archimede Room: MS C

**Contributed Session**

08:30 İsmet Gölgeleyen

*An inverse problem for a generalized transport equation in polar coordinates*

09:00 Fikret Golgeleyen

*On the problem of reconstruction of a Riemannian metric from the Hodograph*

09:30 Winston Sweatman

*Modelling the ripening of cheddar cheese*

10:00 Francesco Vecil

*Deterministic simulation of a DG-MOSFET through a parallel solver*

10:30 – 11:00 Coffee Break

11:00 - 12:00 **Plenary Lecture**

**Claudio Albanese**

*The Mathematics for large scale portfolio simulations*

**Friday 13 June, 12:00 – 13:00**

Main Conference Room - Ettore Majorana Room: MS 5

Michael Coulon and Matthias Ehrhardt

**Mathematical Modelling in Energy Markets**

12:00 Nina Lange

*Currency Risk in Energy Markets*

12:30 Tamsin Lee, Stephen Haben and Peter Grindrod

*Modelling the electricity consumption of small to medium enterprises*

Conference Room 1 - Luigi Pirandello Room: MS 15

José Pedro Silva, Alvaro Leitao Rodriguez, Binghuan Lin and Jinzhe Yang

**Young Researchers' Minisymposium: High Performance Computational Finance**

12:00 José Silva, E Jan W Ter Maten, Michael Günther and Matthias Ehrhardt

*Proper Orthogonal Decomposition in Option Pricing: Basket Options and Heston Model*

12:30 Jinzhe Yang

*Parallel Implementation of Particle Filtering-based Maximum Likelihood Estimation of Jump-Diffusion Model*

Conference Room 2 - Salvatore Quasimodo Room: MS 54

Kathrin Flaßkamp and Timm Faulwasser

**Optimization and Optimization-based Control Methods for Industrial Applications**

12:00 Jürgen Pannek

*Logistics Driven Requirements and Limitations to Model Predictive Control*

12:30 Milan Korda, Faran Ahmed Qureshi, Tomasz T. Gorecki and Colin N. Jones

*Periodic Stochastic Model Predictive Control applied to Building Temperature Control*

Conference Room 3 - Vincenzo Bellini Room: MS 11

Gerd Steinebach, Oliver Kolb and Jens Lang

**Simulation and Optimization of water and gas networks**

12:00 Gerd Steinebach

*From river Rhine alarm model to water supply network simulation by the method of lines*

12:30 Tim Jax and Gerd Steinebach

*ROW methods adapted to network simulation*

Conference Room 4 - Giovanni Verga Room: MS C

## Contributed Session

12:00 J Krishnan

*Elucidating the role of translation termination based feedback control in protein synthesis in yeast*

12:30 Nigel Mottram

*Deformation of liquid drops and thin-films under the influence of an electric field*

Belvedere Room - Archimede Room: MS C

## Contributed Session

12:00 **Wacker prize**

12:30 Dolores Gómez, Alfredo Bermúdez, Rodolfo Rodríguez and Pablo Venegas

*Numerical solution of axisymmetric eddy current problems with hysteresis*

13:00 – 14:30 Lunch

14:30 – 15:30 **Plenary Lecture**

**Jörg Kienitz**

*Quantitative Analytics - xVAs and hybrids pricing*

**Friday 13 June, 15:30 - 16:30**

Main Conference Room - Ettore Majorana Room: MS 5

Michael Coulon and Matthias Ehrhardt

## Mathematical Modelling in Energy Markets

15:30 Magnus Wobben

*Valuation of Storage Contracts in Incomplete Gas Markets*

16:00 Alexander Boogert

*Explaining gas storage levels using price information*

Conference Room 1 - Luigi Pirandello Room: MS 15

José Pedro Silva, Alvaro Leitao Rodriguez, Binghuan Lin and Jinzhe Yang

## Young Researchers' Minisymposium: High Performance Computational Finance

15:30 Alvaro Leitao Rodriguez and Cornelis W. Oosterlee

*On a GPU Acceleration of the Stochastic Grid Bundling Method*

Conference Room 2 - Salvatore Quasimodo Room: MS 54

Kathrin Flaßkamp and Timm Faulwasser

**Optimization and Optimization-based Control Methods for Industrial Applications**

15:30 Karl Worthmann, Christopher Kellett, Philipp Braun, Lars Grüne and Steven Weller  
*Distributed Model Predictive Control for a Smart Grid Application*

16:00 Michael Dellnitz, Julian Eckstein, Kathrin Flaßkamp, Patrick Friedel, Christian Horenkamp, Ulrich Köhler, Sina Ober-Blöbaum, Sebastian Peitz and Sebastian Tiemeyer  
*Multiobjective optimal control methods for the development of an intelligent cruise control*

Conference Room 3 - Vincenzo Bellini Room: MS 11

Gerd Steinebach, Oliver Kolb and Jens Lang

**Simulation and Optimization of water and gas networks**

15:30 Yi Lu, Nicole Marheineke and Jan Mohring  
*Model order reduction via quadratic-linear system for nonlinear-parametric partial differential equation system*

16:00 Alfredo Bermudez, Julio Gonzalez-Diaz, Francisco J. Gonzalez-Dieguez and Angel M. Gonzalez-Rueda  
*Modeling and optimization of gas networks*

Conference Room 4 - Giovanni Verga Room: MS 46

Andras Batkai and Peter L. Simon

**Network processes and differential equations**

15:30 Istvan Kiss, Charles Morris, Fanni Selley, Peter Simon and Robert Wilkinson  
*Exact deterministic representation of Markovian SIR epidemics on networks with and without loops*

16:00 Andras Batkai  
*PDE approximation of large systems of differential equations*

Belvedere Room - Archimede Room: MS C

**Contributed Session**

15:30 Michele Wandelt and Michael Günther  
*Efficient Numerical Simulation of the Wilson Flow in Lattice QCD*

16:00 Harijs Kalis and Maksims Marinaki  
*Numerical study of forced MHD convection flow and temperature around periodically placed cylinders*

16:30 – 17:00 Coffee Break

**Friday 13 June, 17:00 – 19:00**

Main Conference Room - Ettore Majorana Room: MS 5

Michael Coulon and Matthias Ehrhardt

**Mathematical Modelling in Energy Markets**

17:00 Michael Coulon

*An Introduction to Mathematical Models in Energy Markets*

17:30 Christian Jacobsson

*Optimizing renewable, hydro and gas assets as realistically as possible.*

18:00 Virginie Dordonnat and Yannig Goude

*Nonparametric modelling and short-term forecasting of French electricity demand and spot prices*

18:30 Christian Hendricks, Matthias Ehrhardt and Michael Günther

*Integrated Forecasting of day-ahead Prices in the German Electricity Market*

Conference Room 1 - Luigi Pirandello Room: MS 41

Alexander Bibov, Vladimir Shemyakin, Heikki Haario and Marko Laine

**Bayesian and approximative sampling methods for Uncertainty Quantification**

17:00 Marko Laine and Heikki Haario

*Parameter estimation in large scale state space models using ensembles of model runs*

17:30 Vladimir Shemyakin and Heikki Haario

*Tuning parameters of Ensemble Prediction System and optimization with Differential Evolution approach.*

18:00 Oxana Agafonova, Aapo Koivuniemi, Boris Conan, Ashvinkumar Chaudhari, Heikki Haario and Jari Hamalainen

*Numerical and Experimental Modelling of Wind Flow over Hills*

18:30 Alexander Bibov and Heikki Haario

*Stabilizing correction for approximative low-memory Kalman filtering. Extensions and generalizations.*

Conference Room 2 - Salvatore Quasimodo Room: MS 54

Kathrin Flaßkamp and Timm Faulwasser

**Optimization and Optimization-based Control Methods for Industrial Applications**

17:00 Johann C. Dauer, Timm Faulwasser and Sven Lorenz

*Computational Aspects of Optimization-Based Path Following of an Unmanned Helicopter*

17:30 Valeria Artale, Cristina Milazzo, Calogero Orlando and Angela Ricciardello

*Mathematical Applications to an Unmanned Aerial Vehicle*

18:00 Sabrina Fiege, Andreas Griewank and Andrea Walther

*A optimization method for piecewise linear problems*

18:30 Jan Kuřátko and Stefan Ratschan

*Global Multiple Shooting for Hybrid Dynamical Systems*

Conference Room 3 - Vincenzo Bellini Room: MS 26

Steven Vandekerckhove and Garth Wells

**FEniCS and dolfin-adjoint: Innovative tools for automated finite element simulations**

17:00 Erik Burman, Susanne Claus, Peter Hansbo, Mats G. Larson and Andre Massing

*Cut finite element methods for multi-physics problems*

17:30 Bärbel Janssen

*High performance computing with FEniCS*

18:00 Patrick Farrell and Simon Funke

*Automating the computation of Newton systems for PDE-constrained optimization*

18:30 Steven Vandekerckhove

*Optimization of perfectly matched layers in wave propagation problems*

Conference Room 4 - Giovanni Verga Room: MS 46

Andras Batkai and Peter L. Simon

**Network processes and differential equations**

17:00 James Gleeson

*Differential equations from branching process models of popularity*

17:30 Peter L Simon

*Controlling epidemic propagation on a network*

18:00 István Faragó and Róbert Horváth

*On a spatial epidemic propagation model*

Belvedere Room - Archimede Room: MS C

**Contributed Session**

17:00 Ibraheem Alolyan

*Interval Linear Optimization with Fuzzy Inequality Constraints*

17:30 Elvira Rafikova, Luiz Henrique De Vitro Gomez and Marat Rafikov

*Tracking of reference robot trajectory using SDRE control method*