
MASTER PROGRAM

for

**TWELFT INTERNATIONAL ON-LINE CONFERENCE
APPLICATION OF MATHEMATICS IN TECHNICAL AND NATURAL
SCIENCES
JUNE 24-29, 2020**

**All times in the program are GMT+3 (East-European time). Please
synchronize your local time with respect to GMT and join the announced
Zoom sessions on time.**

WEDNESDAY, JUNE 24, 2020

Join Zoom Meeting **10:15-12:15**

<https://us02web.zoom.us/j/83057873367?pwd=a0syK1Q2M3N3cXpZdINzTEYyQVpIUT09>

Meeting ID: 830 5787 3367

Password: 286866

10:30-11:00 OPENING SESSION

11:00-12:00 PLENARY LECTURE: Vladimir Shaydurov
Title: *“Mean Field Games” as Mathematical Models of
Dynamic Socio-Economical Activity*

Host: Michail Todorov

12:00-12:30 BREAK

Join Zoom Meeting **12:30-16:30**

<https://us02web.zoom.us/j/89687381761?pwd=aWNUb3dkV2ZNMl10FB4MktOclJ4Zz09>

Meeting ID: 896 8738 1761

Password: 755571

Session SCIENTIFIC COMPUTING

Host: Michail Todorov

- 12:30-13:00 Speaker: Valentin Gushchin
Title: *On Dynamics of Vortex Pair in Stratified Fluid*
- 13:00-13:30 Speaker: Olga Denysiuk
Title: *Problem of Parametric Optimization of Cross-Sections in Bent Rod Corroding Elements: Method of Solution*
- 13:30-14:00 Speaker: Eugenia Karepova
Title: *Determination of the Heat Dissipation Power of Components in the Electronic Unit Using the Readings of t Built-in Temperature Sensors*
- 14:00-14:30 Speaker: Eugeny Efimov
Title: *Mathematical Modeling of the Impact of a Pulse Seismic Source on Geological Media*
-

Session SCIENTIFIC COMPUTING

Host: Michail Todorov

- 14:45-15:15 Speaker: Levchuk/Leonid Makarenko
Title: *Numerical Modeling of Exchange Coupling Control in System of Donor and Quantum Dot Pairs*
- 15:15-15:45 Speaker: Jordan Genoff – not presented
Title: *Accuracy Analysis in Scientific Computations by Simultaneous Multiple Finite-Precision Arithmetic*
- 15:45-16:15 Speaker: Tiberius Frigioescu
Title: *Distortion Compensation of IN 625 Parts Manufactured by Selective Laser Melting*
-

Join Zoom Meeting **16:30-21:00**

<https://us02web.zoom.us/j/82203759495?pwd=OUFrYm5rNEZkZlg5b2RvZXBFBK091QT09>

Meeting ID: 822 0375 9495

Password: 598796

- 16:30-20:45 Session NUMERICAL METHODS
Host: Michail Todorov
- 16:30-17:00 Speaker: Victoria Kornienko
Title: *The Finite-Difference Solving the Planning Problem of Oncoming to a Given State*
- 17:00-17:30 Speaker: Lidiya Gileva
Title: *Method for Solving the Problem of Pricing an American Put-Option*
- 17:30-18:00 Speaker: Anton Makarov
Title: *On Biorthogonal Approximation of Solutions of Some Boundary Value Problems on Shishkin Mesh*
- 18:00-18:30 Speaker: Madhu Gupta
Title: *Nonstandard Finite Difference Method with Higher Order Accuracy*
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- 18:45-20:45 Session NUMERICAL METHODS
Host: Michail Todorov
- 18:45-19:15 Speaker: Souvik Roy
Title: *A Pontryagin Maximum Principle Based on Fokker-Planck Approach to Control Traffic Motion*
- 19:15-19:45 Speaker: Nectarios Papanicolaou
Title: *Electromagnetic Modeling and Simulation of Microwave and mm-Wave Devices Based on Liquid Crystal Compounds*
- 19:45-20:15 Speaker: Stanislav Harizanov
Title: *Efficient URA-Based Numerical Solvers for $(A^\alpha + qI)u = f$, $\alpha \in (0, 1)$, $q \geq 0$*
- 20:15-20:45 Speaker: Emanuil Atanasov/Maria Durchova

Title: *Efficient Quasi-Monte Carlo Sampling for Quantum
Random Walks*

THURSDAY, JUNE 25, 2020

Join Zoom Meeting **10:15-13:30**

<https://us02web.zoom.us/j/83321801015?pwd=QUZ3RGZWZnRjVWVlrd1pYdTFqcGY0dz09>

Meeting ID: 833 2180 1015

Password: 166286

10:30-11:30 PLENARY LECTURE: Ricardo Carretero-Gonzalez
Title: *Reduction Dynamics for Soliton Stripes, Vortices, and Vortex Rings in Quantum Superfluids*

Host: Michail Todorov

Co-host: Rossen Ivanov

11:30-12:00 BREAK

12:00-13:30 Session SCIENTIFIC COMPUTING
Host: Michail Todorov
Co-hosts: Rossen Ivanov, Nevena Ilieva

12:00-12:30 Speaker: Krasimir Kordov - not available
Title: *Text Encryption Algorithm for Secure Communication*

12:30-13:00 Speaker: Stanimir Zhelezov – not available
Title: *Study of the Efficiency Coefficient of the Steganographic Embedding in Text Containers Using the Letter Replacement Method*

13:00-13:30 Speaker: Dimitar Slavchev
Title: *On the Application of Nested Dissection Reordering for Solving Fractional Diffusion Problems Using HSS Compression*

Join Zoom Meeting **13:45-18:00**

<https://us02web.zoom.us/j/86827626273?pwd=ZCtuQ1puNi80TGw5eURRSW84NCtSQT09>

Meeting ID: 868 2762 6273

Password: 638783

13:45-16:15 Session BIOMATHEMATICS

Host: Michail Todorov

Co-hosts: Rossen Ivanov, Nevena Ilieva

- 13:45-14:15 Speaker: Galin Valchev – not available
Title: *Giant Unilamellar Vesicle Formation: A Protocol Comparison*
- 14:15-14:45 Speaker: Gergana Nikolova
Title: *3D Mathematical Model of the Human Body: Analytical Results*
- 14:45-15:15 Speaker: Victor Olevsky
Title: *Modified Method of Fuzzy Recognition of Proteins in Electrophoresis in Population Genetics*
- 15:15-15:45 Speaker: Anna Antonova
Title: *Effect of Marginal Propensity to Save on Limit Cycle Parameters of Goodwin's Model with "Only Floor" in Induced Investment*
- 15:45-16:15 Speaker: Teerapol Saleewong - cancelled
Title: *Mathematical Modeling of Therapeutic Response to Yttrium-90 for Liver Cancer*
-
- 16:30-18:00 Session BIOMATHEMATICS
Host: Michail Todorov
Co-hosts: Rossen Ivanov, Nevena Ilieva
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- 16:30-17:00 Speaker: Gabriel Dimitriu
Title: *Modeling Dynamic Patterns from COVID-19 Data Using Randomized Dynamic Mode Decomposition in Predictive Mode and ARIMA*
- 17:00-17:30 Speaker: Meglena Lazarova
Title: *On Some Classes of Growth Functions and Their Links to Reaction Network Theory*
- 17:30-18:00 Speaker: Maryann Hohn
Title: *Which Bug Bugs You More? Microbiome Competition and Toxin Interference*
-

Join Zoom Meeting 18:15-20:45

<https://us02web.zoom.us/j/84382656231?pwd=MHNNa0U5Y2c3b2JXQ0k5eCtSdlo2dz09>

Meeting ID: 843 8265 6231

Password: 015863

18:15-19:15 Plenary Lecture: Zhijun (George) Qiao
Title: *Recent Developments on Integrable Peakon Systems*

Host: Michail Todorov
Co-host: Rossen Ivanov

19:15-20:15 Session APPLIED PHYSICS

19:15-19:45 Speaker: Sander Paekivi
Title: *Modeling the Competition between Three Languages*

19:45-20:15 Speaker: Anatoly Prostormolotov
Title: *Hydrodynamics, Heat and Mass Transfer During Crystal Growth in Assembly of "Hele-Shaw" Cells*

20:15-21:15 Session SCIENTIFIC COMPUTING

20:15-20:45 Speaker: Mihaela Condruz
Title: *Solidification Simulation and Casting of an Impeller designed for a Thermochemical Treatment Furnace*

20:45-21:15 Speaker: Michael McCracken - declined
Title: *Relegation Classifier: A Machine-Learning Approach for Optimizing Analysis Significance in the Physical Sciences*

FRIDAY, JUNE 26, 2020

10:30-11:30 Session APPLIED ANALYSIS
Host: Michail Todorov

10:30-11:00 Speaker: Adina Toma – postponed to 29 June
Title: *Determination of Elastic Properties in Metal Parts Made via Additive Manufacturing using Ultrasonic Measurements*

Join Zoom Meeting **11:30-13:30**

<https://us02web.zoom.us/j/85973735487?pwd=MzVCdUVkNUExeHVBbzFldXIFZlZ3Zz09>

Meeting ID: 859 7373 5487

Password: 868770

11:30-12:00 Speaker: Natalia Sukhanova /Alexander Nepp – not presented
Title: *The Impact of Twitter Sentiment Analysis on Stock Prices*

12:00-13:30 Session APPLIED ANALYSIS
Host: Michail Todorov

12:00-12:30 Speaker: Alexander Kerzhaev
Title: *Nonhomogeneous Boundary Value Problem for a Clamped Rectangle: Exact Solution*

12:30-13:00 Speaker: Iryna Hvozdeva
Title: *The Power Estimation of Some Parametric Criteria of Time Series Trends*

13:00-13:30 Speaker: Elena Butsenko - not presented
Title: *Intelligent Software System for Optimizing Adaptive Control of Investment Projecting Processes*

Join Zoom Meeting **13:45-16:15**

<https://us02web.zoom.us/j/85187905054?pwd=U1hNaEpSUEF4Z0JwK3FmQU5BUHVlZz09>

Meeting ID: 851 8790 5054

Password: 903403

- 13:45-16:15 Session APPLIED ANALYSIS
Host: Michail Todorov
- 13:45-14:15 Speaker: Elena Butsenko/Shorikov - not presented
Title: *Optimization of Adaptive Control of Business Planning Processes Based on the Network of Economic and Mathematical Modeling*
- 14:15-14:45 Speaker: Antoaneta Yordanova/Hristina Kulina
Title: *Random Forest Models of 305-Day Milk Yield for Holstein Cows in Bulgaria*
- 14:45-15:15 Speaker: Atanas Ivanov
Title: *Hybrid Boosted Trees and Regularized Regression for Studying Ground Ozone and PM10 Concentrations*
- 15:15-15:45 Speaker: Tzvetan Ostromsky
Title: *Monte Carlo Methods for Sensitivity Studies of Large-Scale Air Pollution Model*
- 15:45-16:15 Speaker: Lucia Florescu
Title: *Improved Interior Tomography Reconstruction Based on Prior Knowledge*
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Join Zoom Meeting **16:30-20:45**
<https://us02web.zoom.us/j/81428855140?pwd=aJJQMlowZzhILzZiZ01TMEthTWNVZz09>
Meeting ID: 814 2885 5140
Password: 691573

- 16:30-17:30 PLENARY LECTURE: Ivan C. Christov
Title: *Mathematical Modeling of Flows in Deformable Conduits*
Host: Michail Todorov
Co-host: Rossen Ivanov
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- 17:30-18:30 Session APPLIED ANALYSIS
Host: Michail Todorov
Co-host: Rossen Ivanov

- 17:30-18:00 Speaker: Yuri Bozhkov
Title: *Differential Equations Involving the Schwarzian*
-

Derivative

18:00-18:30 Speaker: Victoria Rayskin
Title: *Utilization of Dynamical Systems' Multiple Trajectories for Short and Long Terms Time Series Forecasts*

18:45-19:45 Session APPLIED ANALYSIS
Host: Michail Todorov

18:45-19:15 Speaker: Natalia Musatova/Alexander Nepp - not presented
Title: *The Role of Institutional Factors in the Process of Public Mental Health Formation*

19:15-19:45 Speaker: Maksim Abramov/Alexander Nepp – not presented
Title: *How the Tonality of Tweets Impact on the Price and Return of Bitcoin?*

19:45-20:45 Session NUMERICAL METHODS
Host: Michail Todorov

19:45-20:15 Speaker: Ivan Lirkov
Title: *Parallel Algorithms for Processing Digital 3D Images*

20:15-20:45 Speaker: Atanas Ivanov/Snezhana Gocheva – not presented
Title: *Two-Step Time Series Analysis for Air Pollution in Relation to Weather Conditions: Case Study of Nessebar, Bulgaria*

SATURDAY, JUNE 27, 2020

Join Zoom Meeting 10:30-14:00

<https://us02web.zoom.us/j/86864602985?pwd=NHE2U2V0TzRHNFNWY05nQU5mTXF0dz09>

Meeting ID: 868 6460 2985

Password: 021358

10:30-11:30 PLENARY LECTURE: Changzheng Qu
Title: *Liouville Correspondences between Integrable Hierarchies*

Host: Michail Todorov

11:30-12:00 BREAK

12:00-14:00 Session CONTINUUM MECHANICS
Host: Michail Todorov
Co-host: Stoyan Mishev

12:00-12:30 Speaker: Andei Kolyshkin
Title: *Influence of Permeable Boundaries on the Linear Stability of a Convective Flow Caused by a Nonlinear Heat Source*

12:30-13:00 Speaker: Igor Petrakov
Title: *Plane Stress State of a Multilayer Fibrous Composite Differently Resistant to Tension and Compression*

13:00-13:30 Speaker: Dobri Dankov
Title: *Rarefied Gas between Two Coaxial Cylinders. The Effect of Pulsating Motion of the Inner Cylinder at the Cylinders Axis. Acoustic Waves Modeling*

13:30-14:00 Speaker: Alexander Kuzmin
Title: *Transonic Flow Oscillations and Bifurcation over a Flat-Sided Wedge with a Blunt Trailing Edge*

Join Zoom Meeting 14:15-17:00

<https://us02web.zoom.us/j/82920130420?pwd=VHozelJTcUxHTTBJUTBOTVM0eFd6QT09>

Meeting ID: 829 2013 0420

Password: 740728

14:15-15:15 Session CONTINUUM MECHANICS

Host: Michail Todorov

Co-host: Stoyan Mishev

14:15-14:45 Speaker: Maria Varygina

Title: *Numerical Modeling of Wave Processes in Multilayered Micropolar Plates and Shells*

14:45-15:15 Speaker: Irina Smolekho

Title: *Accounting for Singularities of the Electric Field Acting on a Liquid Crystal*

15:15-16:15 Session MATHEMATICAL PHYSICS

Host: Michail Todorov

Co-host: Stoyan Mishev

15:15-15:45 Speaker: Vladimir Gerdjikov

Title: *Riemann-Hilbert Problem, Integrability and Reductions*

15:45-16:15 Speaker: Rossen Ivanov

Title: *Coriolis Effect for Internal Ocean Waves – Hamiltonian Approach*

Session MATHEMATICAL PHYSICS

16:30-17:00 Speaker: Anna Chugainova

Title: *Stability of Special Discontinuities in Solutions of the Generalized KdV-Burgers Equation*

Join Zoom Meeting 17:00-20:45

<https://us02web.zoom.us/j/87510131812?pwd=SVp5T2k3TkptTEtoaWFrYXITbW51Zz09>

Meeting ID: 875 1013 1812

Password: 508683

- 17:00-19:00 Special Session STOCHASTIC AND STATISTICAL MODELING
- Host: Michail Todorov
Co-host: Milan Stehlik
- 17:00-17:30 Speaker: Pavlina Jordanova
Title: *Distribution Sensitive Estimators of the Index of Regular Variation Based on Ratios of Order Statistics*
- 17:30-18:00 Speaker: Venelin Todorov
Title: *A Comparison of Advanced Quasi Monte Carlo Methods for Multidimensional Integrals in Air Pollution Modeling*
- 18:00-18:30 Speaker: Evelina Veleva
Title: *Seasonality of the Levels of Particulate Matter PM10 Air Pollutant in the City of Ruse, Bulgaria*
- 18:30-19:00 Speaker: Tatiana Tchemisova
Title: *On Strong Duality in Linear Semidefinite and Copositive Programming*
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- 19:15-20:45 Special Session STOCHASTIC AND STATISTICAL MODELING
- Host: Michail Todorov
Co-host: Milan Stehlik
- 19:15-19:45 Speaker: Milan Stehlik
Title: *On COVID-19 Predictions: Issues on Stability, Model Sensitivity and Precision*
- 19:45-20:15 Speaker: Vessela Stoimenova
Title: *EM and Accelerated EM Algorithms for Statistical Estimation of Multitype Branching Processes*

20:15-20:45

Speaker: Silvi-Maria Gurova

Title: *Scalability Study of Different MPI Algorithms for a Predator-Prey Model with SEIR Epidemic Disease*

SUNDAY, JUNE 28, 2020

Join Zoom Meeting **10:30-14:00**

<https://us02web.zoom.us/j/88014700971?pwd=MDI5bEs1UmtEYm11UFAvMkZmRWpadz09>

Meeting ID: 880 1470 0971

Password: 037210

10:30-11:30 PLENARY LECTURE: Liu Qing Ping
Title: *Integrable Discretizations for Classical Boussinesq System*
Host: Michail Todorov

11:30-12:00 BREAK

12:00-14:00 Session APPLIED ANALYSIS
Host: Michail Todorov
Co-host: Tzvetan Ostromsky

12:00-12:30 Speaker: Kastriot Zoto
Title: *Unification of Some Results via a General Approach to Simulation Functions in b-Spaces*

12:30-13:00 Speaker: Maya Stoimenova-Minova
Title: *Hybrid CART-ARIMA Approach for PM10 Pollutant Modeling*

13:00-13:20 Speaker: Velizar Pavlov/Evelina Veleva
Title: *Modeling of the Transport Work of Taxi Vehicles in Ruse*

13:20-13:40 Speaker: Ivan Georgiev/Evelina Veleva
Title: *Comparison of Heuristic Algorithms in Solving a Specific Model of Transport Task Using Mixed Integer Linear Programing*

13:40-14:00 Speaker: Ivanka Zheleva/Evelina Veleva
Title: *Vertical Tigels Seasonality of the Levels of Particulate Matter PM10 Air Pollutant in the City of Silistra, Bulgaria*

Join Zoom Meeting 14:15-17:30

<https://us02web.zoom.us/j/88962992622?pwd=T1pBY2ZNdUs3NFpyVXVzTzcydU5JQT09>

Meeting ID: 889 6299 2622

Password: 078146

- 14:15-16:15 Session APPLIED ANALYSIS
Host: Michail Todorov
Co-host: Tzvetan Ostromsky
- 14:15-14:35 Speaker: Denitsa Hvarchilkova/Margarita Filipova
Title: *Preliminary Analysis of Construction and Demolition Waste Management in Bulgaria*
- 14:35-14:55 Speaker: Dzihan Menseidov/Ivanka Zheleva
Title: *Test and Training Model of a Pyrolysis Unit with Three*
- 14:55-15:15 Speaker: Ivan Georgiev//Ivanka Zheleva
Title: *Application of Markov Chains for Studying of Particulate Matter (PM10) Air Contamination for the City of Ruse, Bulgaria*
- 15:15-15:45 Speaker: Olga Rozanova
Title: *Pressureless Euler-Poisson Equations and Exact Thresholds in the Dynamics of Cold Plasma*
- 15:45-16:15 Speaker: Gaik Ambartsoumian
Title: *Inversion and Symmetries of the Star Transform*
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- 16:30-19:00 Session MATHEMATICAL PHYSICS
Host: Michail Todorov
Co-host: Tzvetan Ostromsky
- 16:30-17:00 Speaker: Victoria Kornienko
Title: *Spatial Orientation of Nanoparticle Pairs under Uniform Laser Field*
- 17:00-17:30 Speaker: Daniel Dantchev
Title: *Boundary Conditions Influence on the Behavior of the*

*Casimir Force: A Case Study via Exact Results on the
Ginzburg-Landau Type Fluid System with a Film Geometry*

Join Zoom Meeting **17:30-20:45**

<https://us02web.zoom.us/j/88386105887?pwd=emd0U210NGZvUTBvakdFcWFOZlZlOZ09>

Meeting ID: 883 8610 5887

Password: 861952

- 17:30-18:00 Speaker: Victor Lyashenko/Elena Kobilskaya
Title: *Heat Surce Control During Additive Processes*
- 18:00-18:30 Speaker: Irina Menshova
Title: *The Boundary Value Problem of the Theory of Elasticity
in a Rectangle: An Exact Solution*
- 18:30-19:00 Speaker: Vesselin Gueorguiev
Title: *The A-Body Exactly Solvable Pairing Interaction from an
Engineering Point of View*
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- 19:15-20:45 Session MATHEMATICAL PHYSICS
Host: Michail Todorov
Co-host: Tzvetan Ostromsky
- 19:15-19:45 Speaker: Douglas Singleton
Title: *Modified Commutators vs. Modified Operators in a
Quantum Gravity Minimal Length Scale*
- 19:45-20:15 Speaker: Lachezar Petrov
Title: *Investigating the Effects of Manifold Mixup on Transfer
Learning*
- 20:15-20:45 Speaker: Vladimir Gerdjikov/Michail Todorov
Title: *On Asymptotic Regimes of Manakov Solitons in Adiabatic
Approximation*

MONDAY JUNE 29, 2020

Join Zoom Meeting 10:30-13:15

<https://us02web.zoom.us/j/85243330161?pwd=VTZpcTNXWFVhY0NTYXU5UTRlc2hYQTO9>

Meeting ID: 852 4333 0161

Password: 172240

- 10:30-11:15 KEYNOTE LECTURE: Nevena Ilieva
Title: *Gaining Control over Cytokine Storm in COVID-19: In silico Perspective*
Host: Michail Todorov
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- 11:15-13:15 Special Session MOLECULAR MODELING IN LIFE SCIENCES AND ENGINEERING.

Host: Michail Todorov
Co-host: Nevena Ilieva
- 11:15-11:40 Speaker: Elena Lilkova
Title: *In Silico Indications for Human Interferon Gamma Inhibition by Heparin*
- 11:40-12:05 Speaker: Tsveta Lazarova
Title: *Self-Association of Antimicrobial Peptides in Solution: Formation Patterns*
- 12:05-12:30 Speaker: Fatmegyul Mustan
Title: *Molecular Dynamics Study of the Adsorption and Aggregation of Linear Alkyl Benzene Sulfonate*
- 12:30-12:55 Speaker: Tatyana Dzimbova
Title: *Determination of the Structural Requirements of μ -Opioid Receptor Ligands with Docking*
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- 12:55-13:15 Speaker: Ivailo Katzarov
Title: *Anomalous Effective Diffusivity of Hydrogen in bcc-Fe from RPMD Simulation*
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Join Zoom Meeting 13:30-16:45

<https://us02web.zoom.us/j/89000040742?pwd=UWI2Y0FKSms5dFhxc1p6NVVYZEp4Zz09>

Meeting ID: 890 0004 0742

Password: 028920

13:30-14:30 Session APPLIED ANALYSYS
Host: Michail Todorov

13:30-14:00 Speaker: Adina Toma
Title: *Determination of Elastic Properties in Metal Parts Made via Additive Manufacturing using Ultrasonic Measurements*

14:00-14:30 Speaker: Adina Toma/G. Matache et al.
Title: *A Mini-Review on Non-Destructive Techniques for Additive Manufactured Metal Parts*

14:30-15:30 Session SCIENTIFIC COMPUTING
Host: Michail Todorov

14:30-15:00 Speaker: Alex Fedoseyev
Title: *Finite Element Method Stabilization Supersonic Flows with Flux Correction Transport Method*

15:00-15:30 Speaker: Alex Fedoseev/S. Herasimenka
Title: *Simulation of Silicon Solar Cell Radiation Effects with GEANT4*

15:45-16:45 RECAPITULATION, NOMINATIONS AND OFFICIAL
CLOSING SESSION OF THE CONFERENCE
