BIOMAT Consortium

I³MBS - INTERNATIONAL INSTITUTE FOR INTERDISCIPLINARY
MATHEMATICAL AND BIOLOGICAL SCIENCES

BIOMAT 2025 – 25th International Symposium

25th Anniversary – 2001 - 2025

NOVEMBER 10-13, 2025

Belgrade, Serbia

BIOMAT 2025	Monday November 10	Tuesday November 11	Wednesday November 12	Thursday November 13
09:00 - 09:25	Opening Session BIOMAT Consortium			
09:25 – 10:15	KT1 Mondaini	KT6 Filipovic	KT10 Röst	KT14 Stacey Smith?
10:15 – 10:40	KT2 Kovács	CT7 Kubik	CT14 Balász Boros	CT21 Geretovszky
10:40 – 11:05		CT8 Glavosits	CT15 Tekeli	CT22 Gyuró-Magyar
11:05 - 11:55	KT3 Misic	KT7 Lefraich	KT11 Djordjevic	KT15 Tadic
11:55 – 12:20	CT1 Roy	CT9 Mandal	CT16 Boukhrissi	CT23 Kumar
12:20 - 13:20	Lunch			
13:20 – 14:10	KT4 Dragovich	KT8 Hedrih	KT12 Pardalos	KT16 Samares Pal
14:10 – 15:00	KT5 Vitkovic	KT9 Kojic	KT13 Allali	KT17 Cupic
15:00 – 15:25	CT2 Markovic	CT10 György	CT17 Bairwa	CT24 Régaisz
15:25 – 15:55	Coffee-Break			
15:55 – 16:20	CT3 Assadiki	CT11 Aggarwal	CT18 Radenkovic	KT18 Maddalena
16:20 – 16:45	CT4 Congjie Shi	CT12 Daipeng Chen	CT19 Chikake	
16:45 – 17:10	CT5 Mahmoud A. Ibrahim	CT13 Ibrahim Nali	CT20 Rodic	KT19 Dénes
17:10 – 17:35	CT6 Biswas	BIOMAT General Assembly	Director Board Meeting	
17:35 – 18:00				Closing Session
KT = Keynote Talk, CT = Contributed Talk				

BIOMAT 2025 – 25th International Symposium - 25th Anniversary (2001 – 2025)

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Nov 10, Monday, 09:00 - 09:25 – Opening Session
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Nov 10, Monday, 09:25 – 12:20 – 1st Session

09:25 – 10:15 - KT1 – "Towards a Theory of Protein Domains Evolution "- <u>Rubem. P. Mondaini</u>,
Simão C. Albuquerque Neto, BIOMAT Consortium, Federal University of Rio de Janeiro, Brazil.

10:15 – 11:05 - KT2 – "On a mosquito model with diffusion and delay" - <u>Sandór Kovács</u>, Eötvös
Lorand University, Budapest, Hungary – Mónika Madai, University of Pécs, Hungary.

11:05 – 11:55 – KT3 – "Protein nucleon patterns: Genetic code insights for natural computation –
Natasa Z. Misic, Computational Bioengineering, R&D Institute Lola, Kneza Viseslava 70ᵃ, Belgrade, Serbia

11:55 – 12:20 – CT1 – "Impact of Asynchronous Evolution on Neuronal Extreme Events"- <u>Anupama Roy</u>,
Sudeshna Sinha, Indian Institute of Science Education and Research Mohali, Manauli, Punjab, India. **(*)**

Chair: Branko Dragovich
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Nov 10, Monday, 13:20 – 15:25 – 2nd Session

13:20 – 14:10 – KT4 - "Biological versus physical information" – Branko Dragovich – Institute of Physics,
University of Belgrade, Mathematical Institute of the Serbian Academy of Sciences and Arts, Belgrade,
Serbia.

14:10 –15:00 – KT5 - "From Geometry to Intelligence: Next-Generation Modeling in Medical Engineering"-
<u>Nikola Vitkovic</u>, Ljiljiana Radovic, Milos Sojkovic, Nikola Korunovic – Faculty of Mechanical Engineering,
University of Nis, Serbia.

**15:00 – 15:25 – CT2 – "Mathematical Modeling of Type I Toxin-Antitoxin Systems as a Mechanism of
Bacterial Persistence"-** <u>Sofija Markovic</u>, <u>Faculty of Biology</u>, Magdalena Djordjevic, Institute of Physics ,
<u>University of Belgrade</u>, Hong Yu OU, School of Life Sciences and Biotechnology, Shanghai Jiao Tong
University, China, Marko Djordjevic, Faculty of Biology, University of Belgrade, <u>Serbia</u>.

Chair: Natasa Misic

Nov 10, Monday, 15:55 – 17:35 - 3rd Session

**15:55 – 16:20 – CT3 – "A novel numerical scheme for Hattaf mixed fractional differential equations with
application to mathematical biology"** – <u>Fatima Assadiki</u>, Hanae Boukhrissi - <u>Hassan II University of
Casablanca,</u> Khalid Hattaf – Centre Régional des Métiers de l' Education et de la Formation, Derb Ghalef,
Casablanca, Fouad Lahmidi – Hassan II University of Casablanca, Morocco. **(*)**

**16:20 – 16:45 – CT4 – "Awareness dynamics in modular structures and their impact on disease spread in
an information-epidemic network"-** <u>Congjie Shi</u> – <u>York University, Toronto, Ontario, Canada</u>, Bolyai
Institute, University of Szeged, Hungary, Hugo P. Maia, Silvio C. Ferreira – Departamento de Física,
Universidade Federal de Viçosa, Brazil, Seyed M. Moghadas, Toronto, Canada.

16:45 – 17:10 – CT5 – "Global dynamics of a tumor growth model with three mechanisms"- Mahmoud A.
Ibrahim - Bolyai Institute, University of Szeged, National Laboratory for Health Security, Hungary.

**17:10 – 17:35 – CT6 – "Impact of dispersal and resource allocation trade-offs on preventing
metacommunity-level tipping points"** – <u>Saswati Biswas</u>, Sudeshna Sinha <u>– Indian Institute of Science
Education and Research (IISER) Mohali, India.   (*)</u>

Chair: Nikola Vitkovic

Nov 11, Tuesday, 09:25 – 12:20 – 4th Session

09:25 – 10:15 – KT6 – "Artificial intelligence-based decision support system for cardiovascular disease" – Nenad Filipovic - Faculty of Engineering, University of Kragujevac, Belgrade, Serbia.

10:15 – 10:40 - CT7 – "Identifiability and observability of some epidemiological systems: SIR vs. SIRS"- Alicja B. Kubic - Bolyai Institute, National Laboratory for Health Security, University of Szeged, Benjamin Ivorra - Complutense University of Madrid, Spain, Alain Rapaport – Complutense University of Madrid, University of Montpellier, France, Ángel M. Ramos – University of Montpellier, France.

10:40 – 11:05 – CT8 – "Threshold Dynamics in a Time-Delayed Logistic Model of Cell Populations" – Villő Glavosits – MSc Student in Mathematics (Year 2), Supervisor: Gergely Röst, PhD, Head of Department, Associate Professor , Bolyai Institute, Department of Applied and Numerical Mathematics, University of Szeged, Faculty of Science and Informatics, Hungary.

11:05 – 11:55 – KT7 – "Mathematical and Computational Modeling of Combined Radiotherapy – Oncolytic Virotherapy in Cancer Treatment" – Hamid Lefraich – Faculty of Sciences and Technology, Department of Mathematics and Computer Science, University Hassan First, Settat Morocco. (*)

11:55 – 12:20 – CT9 – "Towards Sustainable Agriculture: An AI-enabled UGV-BasedMultimodal System for Rice Crop Health Monitoring " – Arnab Mandal, Priygshu Majumder, Pritam Jana, Muttalip Sk – Future Institute of Technology, West Bengal, India. (*)

Chair: Sándór Kovács

Nov 11 – Tuesday, 13:20 – 15:25- 5th Session

11:20 – 14:10 – KT8 – " Modelling Phase Transition in Zona Pellucida "- Andjelka Hedrih – Mathematical Institute of the Serbian Academy of Sciences and Arts, Belgrade, Serbia.

14:10 – 15:00 – KT9 – "Multiscale and Multiphysics Finite Element Models in Engineering and Bioengineering - Milos Kojic, Miljan Milosevic, Bogdan Milicevic, Vladimir Simic, Nenad Filipovic- Serbian Academy of Sciences and Arts, Belgrade, Serbia. (*)

15:00 – 15:25 – CT10 – "On Soliton Solutions of the Extended Brusselator Model " – Sándór Kovács, Szilvia György – Departmentof Numerical analysis, Eötvös Lorand University, Budapest, Hungary.

Chair: Nenad Filipovic

Nov 11 – Tuesday, 15:55 – 17:10 – 6th Session

15:55 – 16:20 – CT11 – "Time-Delayed Control-Based Approach to Model HIV and TB Co-Infection" – Rajiv Aggarwal – Department of Mathematics, Sri Aurobindo College, University of Delhi, New Delhi, India. (*)

16:20 – 16:45 – CT12 – "Implications of COVID-19 Nonpharmaceutical Interventions for Endemic infections"- Daipeng Chen, Seyed Moghadas, Gergely Röst – Bolyai Institute, University of Szeged, Hungary, York University, Toronto, Canada.

16:45 – 17:10 - CT13 – " Dynamical Analysis of an HIV Infection Model Including Quiescent Cells and Immune Response" – Ibrahim Nali - Bolyai Institute University of Szeged, Hungary, Attila Dénes - Bolyai Institute, University of Szeged, National Laboratory for Health Security , Budapest, Hungary, Abdemassad Tridane - University Al Ain, United Arab Emirates, Xueyong Zhou, - Xinyang Normal University, China.

Chair: Hamid Lefraich

Nov 12 – Wednesday, 09:25 – 12:20 – 7th Session

09:25 – 10:15 – KT10 – "Rich Epidemiological Dynamics due to the Waning and Boosting of Immunity" – Gergely Röst – National Laboratory for Health Security, University of Szeged; Computational Medicine Group, Hungarian Center of Excellence for Molecular Medicine (HCEMM), Bolyai Institute.

10:15 – 10:40 – CT14 – "The Bifurcations in Small Mass Action-systems"- Balázs Boros – Bolyai Institute, University of Szeged, National Laboratory for Health Security, Hungary.

10:40 – 11:05 – CT 15 – "SEIR Models with Host Heterogeneity: Main Properties and Applications to Seasonal Influenza Dynamics" – Tamás Tekeli, University of Szeged, Hungary, Cinzia Soresina, Andrea Pugliese, University of Trento, Italy.

11:05 – 11:55 – KT11 – "Can Quantitative Details Shape Qualitative Dynamics? Insights from Bacterial Defense Systems"- Marko Djordjevic, Faculty of Biology, University of Belgrade, Magdalena Djordjevic, Institute of Physics, University of Belgrade, Andjela Rodic, Faculty of Biology, University of Belgrade, Jane Kondev, Martin A. Fisher School of Physics, Brandeis University, Waltham, USA.

11:55 – 12:20 – CT16 – "Global Stability of HIV Infection with Adaptive Immunity and Treatments involving the new Generalized Hattaf Fractional Derivative" - Hanae Boukhrissi, Fatima Assadiki - Hassan II University of Casablanca, Khalid Hattaf – Centre Régional des Métiers de l' Education et de la Formation, Derb Ghalef, Casablanca, Fouad Lahmidi – Hassan II University of Casablanca, Morocco. (*)

Chair: Stacey Smith?

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Nov 12, Wednesday -13:20 – 15:25 - 8th Session

13:20 – 14:10 – KT12 –"Network Analysis, Data Sciences, and Control in Computational Neuro-Science"- Panos Pardalos – University of Florida, USA. (*)

14:10 – 15:00 – KT13 – "On the Dynamics of an SEIQR Epidemic Model wirh Evolutionary Game Theory" – Karam Allali – Hassan II University of Casablanca, Mohammedia, Morocco. (*)

15:00 – 15:25 – CT17 – "Influence of Intraspecific Competition and Habitat Complexity on Chaos Control and Stability in a Food Web" – Suneel Kumar Bairwa – Department of Mathematics, University of Delhi, Vinay Kumar – Department of Mathematics, Zakir Husain Delhi College, University of Delhi, India. (*)

Chair: Lucia Maddalena

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Nov 12, Wednesday, 15:55 – 17:10 – 9th Session

15:55 – 16:20 – CT18 – "Nonlinear Analysis of Electrophysiological Signals to early detect and monitor Disorders in Neurology and Psychiatry: Digital Health Application" – Milena Cukic Radenkovic– ZHAW Institute for Computational Life Sciences, Switzerland, Victoria Lopes – CUNEF Universidad, Almansa Campus, Madrid, Spain.

16:20 – 16:45 – CT19 – "Pseudo-Boolean Polynomial Framework for Interpretable Biomedical Data Processing A Unified Approach to Pattern Analysis in Medical Applications"- Tendai M. Chikake, Boris I. Goldengorin – Moscow Institute of Physics and Technology, Russia, Panos M. Pardalos – Center for Applied Optimization, University of Florida, Gainesville, USA.   (*)

16:45 – 17:10 – CT20 - "Integration of Modeling, Bioinformatics, and Experiments Chalenges the Role of Toxin-Antitoxin Systems in Persister Formation"- Andjela Rodic, - Faculty of Biology, Bojana Ilic - Institute of Physics, Marko Djordjevic – Faculty of Biology, University of Belgrade, Hong Yu-Ou – Shanghai Jiao Tong University, China.

Chair: Marko Djordjevic

Nov 13, Thursday, 09:25 – 12:20 – 10th Session

09:25 – 10:15 – KT14 – "Modeling the Buruli Ulcer in Disparate Regions: Australia and Africa" – Stacey Smith?- Department of Mathematics and Faculty of Medicine, University of Ottawa, Canada.

10:15 – 10:40 – CT21 - "When Saboteur Bacteria undermine Chemoterapy: A mathematical Model of Cancer Dynamics" - Anna Geretovsky, Gergely Röst, Bolyai Institute, University of Szeged, Hungary.

10:40 – 11:05 – CT22 - "Qualitative Analysis of a Mosquito Model" – Nóemi Gyuró-Magyar, Sándór Kovács – Eötvös Loránd University, Hungary.

11:05 – 11:55 – KT15 – "Multiscale Dynamics and Higher-order Structures of Human Connectome: Towards understanding Complexity of Brain functioning and Disorders" – Bosiljka Tadic, Department of Theoretical Physics, Josef Stefan Institute, Ljubljana, Slovenia.   (*)

11:55 – 12:20 – CT23 – "Modeling Buruli Ulcer Transmission Using Fractional-Order Derivatives: Effects of Reinfection, Relapse, and Control Strategies"- Ravi Kumar - Department of Mathematics, Rajiv Aggarwal – Department of Mathematics, Sri Aurobindo College, Tanvi – Department of Mathematics, Deshbandhu College, University of Delhi, India.   (*)

Chair: Attila Dénes
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Nov 13, Thursday, 13:20 – 15:25 – 11th Session

13:20 – 14:10 – KT16 – "Hunting Cooperation and Fear in Predator-Prey Systems: A Mathematical Model"- AnimaSarkar, Sasanka Shekhar maity, Samares Pal – Department of Mathematics, University of Kalyani, India. (*)

14:10 – 15:00 – KT17 - "Modelling the Neuro-endocrine Systems as Reaction Networks"- Zeljko Cupic, Ana Ivanovic-Sasic – Institute of Chemistry, Technology and Metallurgy, Stevan Macesic – Faculty of Physical Chemistry, University of Belgrade, Serbia.

15:00 – 15:25 – CT24 - "Modeling the 2025 Foot-and-Mouth disease Outbreak in the Hungary-Slovakia Border Region" – Olivér Régaisz, Bolyai Institute, University of Szeged.

Chair: Gergely Röst

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Nov 13, Thursday, 15:55 – 17:35 – 12th Session

15:55 – 16:45 – KT18 – "On Risk Assessment Models for Tobacco Products" – Lucia Maddalena, Institute for High-Performance Computing and Networking, Naples, Italy. (*)

16:45 – 17:35 – KT19 – "A Seasonal Model for Subcutaneous Dirofilariosis"- Attila Dénes – Bolyai Institute, University of Szeged, National Laboratory for Health Security, Hungary, Ama Marie-Noelle - University of Montpellier, France, Gergely Röst - Bolyai Institute, University of Szeged, National Laboratory for Health Security, Hungary.

Chair: Rubem P. Mondaini

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(*) Online Presentation

Nov13, Thursday – 17:35 – 18:00 - Closing Session