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Banach Center
INSTITUTE OF MATHEMATICS PAS

Warsaw Center
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PROGRAM

International Conference

MICRO AND MACRO SYSTEMS IN LIFE SCIENCES

JUNE 8-13, 2015

CONFERENCE CENTER OF THE BANACH INSTITUTE OF THE POLISH ACADEMY OF SCIENCES

BĘDLEWO, POLAND

UNIVERSITY OF WARSAW

icm

Society for Mathematical Biology

Sunday, June 7

15:00 - 18:00	Registration of the participants
18:00	**Dinner**

Monday, June 8

7:45 - 8:45 **Breakfast** /Registration

8:45 - 8:55 **Opening Remarks** – Mirek Lachowicz, Urszula Ledzewicz

8:55-9:00 **Introduction of the keynote speaker**: Bogdan Bojarski, PAN, Poland

9:00 - 9:45 **Keynote Address**: **Avner Friedman**, Ohio State University, Columbus, USA
A free boundary problem associated with the risk of high cholesterol

9:45 - 10:00 Coffee break

10:00 - 12:50 Parallel Sessions

	Cancer Therapies and Control I Chair: H. Byrne	**Micro Systems: Cellular and Molecular I** Chair: Ch. Surulescu
10:00-10:25	**Clairambault, Jean** INRIA, Paris, France *Drug resistance in cancer; biological and medical issues, continuous modeling using populations structured dynamics*	**Berlyand, Leonid** Pennsylvania State University, University Park, USA *PDE/ODE models of motility in active biosystems*
10:25-10:50	**Kuang, Yang** Arizona State University, Tempe, USA *Dynamics model of prostate cancer treatment*	**Hubert, Florence** University of Aix-Marseille, France *Mathematical modeling of the microtubule dynamic instabilities*
10:50-11:15	**Wodarz, Dominik** University of California, Irvine, USA *Treatment of chronic lymphocytic leukemia (CLL) with new targeted inhibitors*	**Peradzynski, Zbigniew** Military University of Technology, Warsaw, Poland *Mathematical modeling of calcium induced calcium influx waves*
11:15-11:35	**Coffee break**	**Coffee break**
11:35-12:00	**Bezenkry, Sebastian** INRIA, Bordeaux, France *A dynamical study of concomitant tumor resistance*	**Lipniacki, Tomasz** Insitute of Fundamental Technological Research, Warsaw, Poland *NF-κB and IRF3 crosstalk signaling in MEFs*
12:00-12:25	**Kim, Peter** University of Sydney, Sydney, Australia *Cancer-immune dynamics of oncolytic virotherapy and dendritic cell vaccines*	**Kashdan, Eugene** University College Dublin, Ireland *Light as a biomarker: computer-assisted reconstruction and analysis of genetic properties of cells from their microscopic images*
12:25-12:50	**Ledzewicz, Urszula** Southern Illinois University Edwardsville, USA *Modeling and Optimization of Metronomic Chemotherapy: More Questions Than Answers*	**Bartlomiejczyk, Agnieszka** Gdańsk University of Technology, Gdańsk, Poland *Modelling gene expression of a self-regulating protein*

12:50 - 14:30 **Lunch break**

14:30 - 15:15 **Plenary Talk II**: **Adelia Sequiera**, Instituto Superior Técnico, University of Lisbon
Mathematical modeling of the early stages of atherosclerosis

15:15 - 15:30 **Coffee break**

15:30 - 17:55 Parallel Sessions

Models and Methods in Cancer I

Chair: J. Clairambault

Modeling Spread and Treatment of Diseases I

Chair: H. Schaettler

15:30-15:55	**Hillen, Thomas** University of Alberta, Edmonton, Canada *Using anisotropic diffusion to model glioma spread*	**Rempala, Greg** Ohio State University, Columbus, USA *Stochastic Model of Ebola Epidemic*
15:55-16:20	**Hanin, Leonid** Idaho State University, USA *A "universal" model of metastatic cancer: What can one learn from site-specific volumes of metastases?*	**Yakubu, Aziz-Abdul** Howard University, Washington, DC, USA *A bovine babesiois model with dispersion*
16:20-16:45	**Sonner, Stefanie** *Technical University, Kaiserslautern, Germany* *A stochastic micro-macro model for cancer cell proton dynamics*	**d'Onofrio, Alberto** International Prevention Research Institute, Ecully, France *Mathematical modelling of the spread of infectious diseases: beyond classical approach*
16:45-17:05	**Coffee break**	**Coffee break**
17:05-17:30	**Morales-Rodrigo, Cristian** Univ. de Sevilla, Sevilla, Spain *On some PDE models related to tumor*	**Ouifki, Rachid** SACEMA, Stellenbosch University, Stellenbosch, South Africa *Modelling the control of Trypanosoma brucei rhodesiense through mass chemoprophylaxis and insecticide-treated cattle*
17:30-17:55	**Stepien, Tracy** Arizona State University, Tempe, USA *Mathematical Modeling and Analysis of Glioblastoma Tumor Growth*	**Callendar, Hannah** University of Portland, Portland, USA *Infectious Diseases on Networks using NetLogo*

18:00 **Welcome Reception (Wine)**

18:30 **Dinner**

Tuesday, June 9

8:00 - 9:00 **Breakfast**

9:00 - 9:45 **Plenary Talk III: Nicolas Andre**, Childrens Hospital La Timone, Marseille, France
From low dose chemotherapy to Metronomics

9:45 - 10:00 Coffee break

10:00 - 12:50 Parallel Sessions

	Tumor Immune System Interactions Chair: Y. Kuang	**Micro to Macro Systems** Chair: D. Wodarz
10:00-10:25	**Levy, Doron** University of Maryland, College Park, USA *The role of the autologous immune response in chronic myelogenous leukemia*	**Helen Byrne** University of Oxford, Oxford, UK *Seeing the wood for the trees with mathematical modelling*
10:25-10:50	**Forys, Urszula** University of Warsaw, Warsaw, Poland *Prostate Cancer Immunotherapy Model*	**De Angelis, Elena** DISMA - Politecnico di Torino, Turin, Italy *A kinetic approach to Darwinian dynamics*
10:50-11:15	**Delitala, Marcello** Politecnico di Torino, Turin, Italy *Cancer cells and T-cells under immunotherapy*	**Lachowicz, Miroslaw** University of Warsaw, Warsaw, Poland *Self-organization: From microscopic to macroscopic*
11:15-11:35	**Coffee break**	**Coffee break**
11:35-12:00	**Piotrowska, Monika** University of Warsaw, Warsaw, Poland *The immune system-tumour interactions model with discrete time delay: model analysis and validation*	**Rosini, Massimiliano D.** ICM, University of Warsaw, Warsaw, Poland *Rigorous derivation of nonlinear scalar conservation laws from follow-the-leader type models via many particle limit*
12:00-12:25	**Summer, Ilyssa** Arizona State University, Tempe, USA *Oncolytic Virotherapy to Treat Cancer and Immune System Effects*	**Cieslak, Tomasz** IMPAN, Warsaw, Poland *Chemorepulsion, the role of a sign*
12:25-12:50	**Smieja, Jaroslaw**, Silesian Technical University, Gliwice, Poland *On differences between experimental and real-life models*	**Natalie Emken** University of Munster, Munster, Germany *Simulations of actin-mediated polarity in yeast by a continuous reaction-diffusion-advection system*

12:50 - 14:30 Lunch break

14:30 - 15:15	**Plenary Talk IV: James Keener**, University of Utah, Salt Lake City, USA *Flexing Protein muscles: How to Pull with a "Burning Rope"*
15:15 - 16:15	**Poster Session** **(List of the Poster Presentations is given on the next page of the Program)**
16:15 - 16:45	**Coffee Break**
16:45 - 17:45	**Panel Discussion - Career and Funding Opportunities in Mathematical Biology,** moderator: **Urszula Ledzewicz**, panelists: (to be announced)
18:00 - 19:00	**Concert of Chamber Music**
19:00	**Banquet (Announcement of Best and Outstanding Poster Awards)**

List of Poster Presentations

1. **Barlukova, Ayuna,** Aix-Marseille University, Marseille, France, *Aging of microtubules and effect of antimicrotubule drugs*

2. **Bellandi, Davide,** University of Ferrara, Ferrara, Italy, *On a fully discrete kinetic model of complex systems*

3. **Biegel, Hannah,** University of Portland, Portland, USA, *Implications of multiple sensitivity analysis techniques in stochastic models of focal adhesion dynamics*

4. **Bogdańska, Magdalena,** University of Warsaw, Warsaw, Poland, *Mathematical model suggests a way to assess low grade glioma malignancy*

5. **Botesteanu** , **Dana-Adriana** Pennsylvania State University, University Park, USA*, A stochastic model of High-grade serous ovarian cancer progression prior to treatment initiation*

6. **Dębowski, Mateusz,** University of Warsaw, Warsaw, Poland, *DNA melting model*

7. **Hillen, Thomas**, University of Alberta, Edmonton, Canada, *Mathematical Modelling of the Tumor Growth Paradox and more ...*

8. **Jędrak, Jakub,** Polish Academy of Sciences, Warsaw, Poland *Influence of gene copy number on gene expression*

9. **Mizuhara, Mathew,** Pennsylvania State University, University Park, USA, *Motility of keratocyte cells: asymptotic and numerical analysis via a phase field model*

10. **Paździorek, Przemysław** Polish Academy of Sciences, Warsaw, Poland, *Long time behaviour of the stochastic model of stem cells differentiation with switching*

11.**Rinke, Kristine,** OVGU, Magdeburg, Germany, *Modelling of Neutropenia after AML treatment*

12.**Rutter, Erica,** Arizona State University, Tempe, USA, *Data-Validated Model of Glioblastoma Tumor Growth*

13. **Rybář Vojtěch** , Institute of Mathematics, Academy of Sciences, Czech Republic, *Numerical study of non-uniqueness of Turing patterns*

14. **Settles, Luke,** Southern Illinois University Edwardsville, USA, *Adjoint Sensitivity Analysis and Optimal Control: Mathematical Model and Vicodin Abuse*

15. **Shahriyari, Leili,** Mathematical Biosciences Institute, Columbus, USA, *The role of the stem cell niche in delaying cancer*

16. **White, Diana,** Aix-Marseille University, Marseille, France, *Microtubule patterning in the presence of motor proteins*

17. **Zwolenski, Paweł,** Polish Academy of Sciences, Warsaw, Poland *Phenotypic evolution in sexual populations*

Wednesday, June 10

8:00 - 9:00 **Breakfast**

9:00 - 9:45 **Plenary Talk V: Andrzej Swierniak**, Silesian University of Technology, Gliwice, Poland,
Controllability and Sensitivity of Models of Combined Anticancer Therapy

9:45 - 10:00 **Coffee break**

10:00 - 11:50 Parallel Sessions

	Modeling in Ecology and Evolution I Chair: D. Levy	**Models in Social and Health Science** Chair: E. De Angelis
10:00-10:25	**Rom Kedar, Vered** The Weizmann Institute, Rehovot, Israel *Algae blooms*	**Sager, Sebastian** Otto-von-Guericke Universität Magdeburg, Germany *Optimization for Clinical Decision Support*
10:25-10:50	**Marciniak-Czochra, Anna** Heidelberg University, Heidelberg, Germany *Quasi-stationary and shadow limits of multiscale reaction-difusion-ode models of biological pattern formation*	**Dawidowicz, Antoni Leon** Jagiellonian University, Cracow, Poland *On the age-dependent predator - prey model*
10:50-11:05	**Coffee break**	**Coffee break**
11:05-11:30	**Bodnar, Marek** University of Warsaw, Warsaw, Poland *General model of a cascade of reactions with time*	**Just, Winfried** Ohio University, Athens, USA *Transmission of infectious diseases and of catchy ideas*
11:30-11:55	**Louzoun, Yoram** Bar Ilan University, Ramat Gan, Israel *Fluctuations-induced coexistence in public goods dynamics*	**Peace, Angela** National Institute for Mathematical and Biological Synthesis, Knoxville, USA *Nutrient and toxic stressors in food chain models*

11:55 - 12:45 **Lunch break**

12:45 - 18:30 **Sightseeing tour**

18:30 **Dinner**

Thursday, June 11

8:00 - 9:00 **Breakfast**

9:00 - 9:45 **Plenary Talk VI: Angela Stevens**, University of Münster, Munster, Germany
Mathematical Modeling of the Dynamics of the Cellular Cytoskeleton

9:45 - 10:00 **Coffee Break**

10:00 - 12:50 Parallel Sessions

Cancer Therapies and Control II		**Mathematical Methods in Life Science**	
Chair:	T. Hillen	Chair:	M. Rosini
10:00-10:25	**Jain, Harsh** Florida State University,Tallahassee USA *Endothelial-tumor cell crosstalk and its implications for therapy*	**Finkenstein, Dmitri** Swansea University, Swansea, UK *Nonlocal kinetic equations derived from stochastic dynamics of complex systems*	
10:25-10:50	**Wilson, Shelby** Morehouse College, Atlanta, Georgia, USA *Modeling tumor growth and anti-angiogenic drugs efficacy: from multiscale to mixed-effect models*	**Falkiewicz, Aleksandra** Lodz University of Technology, Lodz, Poland *Asymptotic state lumping in network problems*	
10:50-11:15	**Fujarewicz, Krzysztof** Silesian University of Technology, Gliwice, Poland *Optimization of spatiotemporal control for systems described by cellular automata*	**Mityushev, Vladimir** Pedagogical University of Cracow, Cracow, Poland *Deterministic description of random biological structures*	
11:15-11:35	**Coffee break**	**Coffee break**	
11:35-12:00	**Bunimovich, Svetlana** Ariel University, Ariel, Israel *Mathematical model of BCG treatment personalization for urinary bladder carcinoma*	**Leszczynski, Henryk** University of Gdańsk, Gdańsk, Poland *Newton's method for nonlinear stochastic wave equations*	
12:00-12:25	**Surulescu, Christina** Technical University, Kaiserslautern, Germany *Multiscale models for glioma invasion: proliferation and therapy aspects*	**Kazmierczak, Bogdan** Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland *Stationary Waves on the Sphere*	
12:25-12:50	**Carrère, Cécile** Aix-Marseille Université, Marseille, France *Optimal treatment for an heterogeneous in vitro tumor composed of resistant and sensitive cells*	**Dudziuk, Grzegorz** ICM University of Warsaw, Warsaw, Poland *On optimal location of thermostats in a model of feedback control*	

12:50 - 14:30 Lunch break

14:30 - 15:15 **Plenary Talk VII**: **Vincenzo Capasso,** ADAMSS Universitá degli Studi di Milano, Italy, Mathematical modeling of tumor-driven angiogenesis. A mean field model

15:15 - 15:30 Coffee Break

15:30 - 17:55 Parallel Sessions

	Models and Methods in Cancer II	**Micro Systems: Cellular and Molecular II**
	Chair: L. Hanin	Chair: L. Berlyand
15:30-15:55	**Hatzikirou, Haralampos** Technical University, Dresden, Germany Multiscale modeling of the impact of ECM ligand density and cell-cell adhesion on the onset of EMT	**Miekisz, Jacek** University of Warsaw, Poland *Mean-field approximation in gene regulation and evolutionary games*
15:55-16:20	**Rejniak, Katarzyna** Moffitt Cancer Research Institute, Tampa, USA *Understanding the dynamics and complexity of the interstitial drug transport in pancreatic tumors: integration of in-silico and in-vivo experiments*	**Szymanska, Zuzanna** ICM, University of Warsaw, Warsaw, Poland *Mathematical modeling of the intracellular protein dynamics: the importance of active transport along microtubules*
16:20-16:45	**Stinner, Christian** Technical University, Kaiserslautern, Germany *On a multiscale model involving cell contractivity and its effects on tumor invasion*	**Bartoszek, Krzysztof** Uppsala University, Uppsala, Sweden *Tree-free phylogenetic comparative methods: macroevolutionary dynamics on a branching process*
16:45-17:05	**Coffee break**	**Coffee break**
17:05-17:30	**Psiuk- Maksymowicz, Krzysztof** Silesian University of Technology, Gliwice, Poland *A hybrid model of tumour induced angiogenesis in 3D*	**Ochab-Marcinek, Anna** Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland *Binary to graded response conversion in autoregulated genes: transcriptional leakage vs. noise*
17:30-17:55	**Shahriyari, Leili** Mathematical Biosciences Institute, Columbus, USA *The role of tissue architecture in the context of tumor evolution*	**Bobrowski, Adam** Lublin Univerity of Technology, Lublin, Poland Convergence of operator semigroups in models of mathematical biology

18:00 Barbecue Dinner (outdoors)

Friday, June 12

8:00 - 9:00 **Breakfast**

9:00 - 9:45 **Plenary Talk VIII: Mark Lewis,** University of Alberta, Edmonton, Canada,
Genetic consequences of range expansion under climate change

9:45 - 10:00 **Coffee Break**

10:00 - 12:50 Parallel Sessions

	Modeling in Ecology and Evolution II Chair: V. Rom-Kedar	**Spread and Treatment of Diseases II** Chair: A. d'Onofrio
10:00-10:25	**Ziyadi, Najat** Morgan State University, Baltimore, USA *A mathematical model of Nutrients-Phytoplankton-Oysters in a bay ecosystem*	**Afenya, Evans** Elmhurst College, Chicago, USA *Mathematical Modeling of Disease Dynamics Based on Current Paradigms*
10:25-10:50	**Tello, J.Ignacio** Technical University of Madrid, Madrid, Spain *On a two species chemotactic system*	**do Pinho, Maria Rosario** University of Porto, Porto, Portugal *Optimal control for infectious diseases*
10:50-11:15	**Wrzosek, Dariusz** University of Warsaw, Warsaw, Poland *Predator-prey model with diffusion and indirect prey-taxis*	**Silva, Cristiana** University of Aveiro, Aveiro, Portugal *Optimal control and cost-effectiveness analysis for a tuberculosis model*
11:15-11:35	**Coffee break**	**Coffee break**
11:35-12:00	**Kozicki, Jurij** Maria Curie-Sklodowska University, Lublin, Poland *Evolution of states of a spatial ecological model: Micro- and mesoscopic descriptions*	**Duncan, Dominique** University of California, Davis, USA *Identifying Changes in Brain MRI in Early Stages of Alzheimer's Disease*
12:00-12:25	**Wieczorek, Radosław** University of Silesia, Katowice, Poland *A nonlinear age-structured model of semelparous species*	**Schaettler, Heinz** Washington University, St. Louis, USA *An Epidemiological Model for the Spread of an Infectious Disease with Quarantine*

12:25 - 12:50 **Best and Outstanding Poster Awards: Presentations**

12:50 - 14:30 **Lunch break**

14:30 - 15:15 **Plenary Talk IX: Mark Chaplain**, University of St Andrews, St. Andrews, Scotland
Hopf Bifurcation in a Gene Regulatory Network Model: Molecular Movement Causes Oscillations

15:15 - 15:30 Coffee Break

15:30 - 16:15 **Plenary Talk X: Ryszard Rudnicki**, Polish Academy of Sciences, Warsaw, Poland
Piecewise deterministic Markov processes in biological models

16:15 - 16:30 Coffee break

16:30 - 17:30 **Closing Panel Discussion – Where do we go from here?**

Challenges and Future Directions for Micro and Macro Systems in Life Sciences

moderator: **Avner Friedman**, panelists: (to be announced)

17:30 - 17:45 Closing Remarks: Mirek Lachowicz, Urszula Ledzewicz

17: 45 - 18:15 Farewell Wine Reception

18:15 Dinner

Saturday, June 13

8:00 - 9:00 Breakfast

Informal Round Table Discussions

12:00 Lunch

Optional Walking Tour of Poznan Old Town (shopping at the Market Square)