BIOKYBERNETIKA 2017

4th Annual "Arbeitstreffen" of German Initiative Biokybernetik

Patho-Biokybernetik - Disorders of MultiScale Control in Complex Diseases

Convenor: Jochen Mau
Heinrich Heine University Düsseldorf

and

2nd Russo-German Conference MultiScale BioMathematics – Coherent Modeling of Human Body System

Convenors: Sergey I. Mukhin, Jochen Mau
Lomonosov Moscow State University,
Heinrich Heine University Düsseldorf

11 - 12 December 2017
TRYP Duesseldorf Krefeld
Europapark A1, Krefeld-Fichtenhain

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Announced at **60th Biometrical Colloquium, 10-13 March 2014, Bremen,** the Initiative aims to create a forum for advancement of systems- and automation-engineering (kybernetik) methodology in transdisciplinary interaction towards mathematical modeling of human body system at functional and operational levels in its life-sphere context.

Activities in 2014:

- At the **First Workshop "Arbeitstreffen zur Initiative Biokybernetik", 20-21 November 2014, in Großkarlbach / Palatinate, Germany**, fifteen invited scientists from academia and public sector research institutions contributed from their research in engineering, mathematics, informatics, and clinical medicine.

Activities in 2015:

- **Session "Biokybernetik"** during **61st Annual Colloquium of German Biometric Society, 15-19 March 2015, Dortmund**. Four oral presentations on biomathematical tumor-spread modelling, biomedical engineering, and kybernetik modelling of thyroid gland activity; two posters.
- **Workshop "GeneSEES[1] – Genetics, Systems Medicine, Environmental Exposures, Economic & Social Settings – 2015: Loss of Control as a Slow Health Hazard, 07 September 2015"** embedded in the **60th Annual Conference of German Society for Medical Informatics, Biometry, and Epidemiology, 6-9 September 2015, Krefeld**. This workshop focused on genetic neurology and environmental impact, systems medicine from clinical and from engineering viewpoints, and on mathematical neuroscience, including neuro-economics.
- **2nd Annual Workshop "Arbeitstreffen" on Bio-Automation: "Methods of Modeling - A Review", 19-20 November 2015, Großkarlbach / Palatinate** with lectures on mathematical modeling of flow in human body system, game theory and agent-based modeling, urbanization impact on health as new topics.

Activities in 2016:

- **BIOKYBERNETIKA 2016: 1st Russian-German Conference *MultiScale BioMathematics: Coherent Modeling of Human Body System* and 1st Russian-German "Young Talent" Workshop *Mathematical Bio-systems Modeling*, 07-09 November 2016, Lomonosov Moscow State University, Moscow, Russia** with 13 lectures and 7 YT talks on dynamic mathematical models, one medical lecture on neuroendocrinology and autoimmune activity. Speakers came from China, Sweden, Russia (Moscow, St. Petersburg), France and Germany.
- **3rd Annual Workshop "Arbeitstreffen" on Bio-Automation: "Neurodynamics and Functional Control", 02 December 2016, Berlin** with lectures on behavior as emergent property, learning neuroprostheses, mobile brain/ body imaging, functional hierarchies, and hierarchical control design (Local host: Prof. J. Raisch, TU Berlin).

Activities in 2017

- **Behavioral Cybernetics Meeting 2017:** planned for July in Düsseldorf did not find enough speakers.
- **BIOAUTOMATION 2017:** proposed for mid-October as a Chinese-only workshop at East China University of Sciene and Technology in Shanghai, did not receive a grant from the targeted Chinese funding agency.
- **BIOKYBERNETIKA 2017: 2nd Russo-German Conference: *MultiScale BioMathematics: Coherent Modeling of Human Body System* and 4th Annual "Arbeitstreffen" of German Initiative Biokybernetik: *Patho-Biokybernetik - Disorders of MultiScale Control in Complex Diseases*, 11-12 December 2017, TRYP Duesseldorf Krefeld, Krefeld-Fichtenhain, Germany** with fourteen lectures in a broad spectrum from society, behavioral control, methodology of modeling and data analysis, genetic and physiological control to multi-scale modeling and one tutorial on disorders of multi-scale control in complex diseases; as for subject matter disciplines, there are two clinical talks, one behavioral cybernetics talk, two social sciences talks, six modeling or computational methodology talks, and three mathematical talks. Speakers are coming from China, Germany, and Russia (Moscow, Samara, St. Petersburg). Because of the critical season, further invited speakers from China, Germany, Russia and Switzerland could not come due to teaching commitments or conferences abroad.

Intended Activities in 2018

- **1st Spring Meeting of German Initiative Biokybernetik** is in early preapration stage **for March 2018.** Because of the critical X-mas season, further invited speakers from China, Germany, Russia and Switzerland had to decline their participation in BIOKYBERNETIKA 2017 due to teaching commitments or conferences abroad. For them, another meeting is considered to take place in the lecture-free period before Easter 2018.
- One will try to have the **3rd Russo-German Conference** (**BIOKYBERNETIKA 2018**) in Moscow, again.
- **5th Annual Arbeitstreffen of German Initiative Biokybernetik: *Patho-Biokybernetik - Disorders of MultiScale Control in Complex Diseases***, will be prepared for November / December 2018 in Germany.

Institutes participating at least once during 11/ 2014 - 12/ 2017 (first 37 months of Initiative Biokybernetik)

Engineering Sciences
1. Aachen: Helmholtz Institute of Biomedical Engineering: Medical Information Technology
2. Berlin Technical University: Control Systems
3. Bochum: Ruhr University: Electrical Engineering
4. Kaiserslautern: Technical University: Automation Engineering
5. Magdeburg University: Control Engineering
6. Magdeburg University: Automation Engineering
7. Magdeburg: Max Planck Institute for Dynamics in Complex Technical Systems
8. Shanghai: East China University of Science and Technology: Automation Engineering
9. Stuttgart University: Systems Theory and Control Engineering
10. Stuttgart University: Systems Dynamics

Mathematical Sciences
1. Beijing: Academy of Mathematics and Systems Sciences of China Academy of Sciences: Systems Sciences
2. Berlin: Weierstrass Institute of Applied Stochastics: Nonlinear Optimizations
3. Jülich: Research Center Jülich, Institute of Complex Systems
4. Kaiserslautern Technical University: Biomathematics
5. Lyon: Centre National de Recherches Scientifique
6. Münster University: Applied Mathematics
7. Moscow: Lomonosov Moscow State University: Computational Mathematics & Cybernetics
8. Moscow: Institute of Applied Mathematics of Russian Academy of Sciences
9. Moscow: Institute of Numerical Mathematics of Russian Academy of Sciences
10. Moscow: Institute of Mathematical Problems in Biology of Russian Academy of Sciences
11. Moscow: Institute of Control Science of Russian Academy of Sciences
12. Saint Petersburg State University: Theoretical Cybernetics
13. Saint Petersburg: Institute of Problems in Mechanical Engineering of Russian Academy of Sciences
14. Samara: Institute of Control of Complex Systems of Russian Academy of Sciences

Informatics
1. Mannheim University of Applied Sciences: Medical Information Processing
2. Münster University: Informatics
3. Saarland University Hopsital: Institute of Medical Biometry, Epidemiology and Medical Informatics

Systems Biology
1. Munich Helmholtz Center for Health: Computational Biology
2. Munich University (LMU): Institute of Medical Informatics, Biometry and Epidemiology
3. Shenzhen: South China University of Science and Technology, Department of Biology

Clinical Medicine
1. Bochum Ruhr University Hospital Bergmannsheil: Endocrinology
2. Düsseldorf University Hospital: Rheumatology, Hiller Research Center
3. Essen University Hospital of University Duisburg-Essen: Neurology
4. Hangzhou Second Affiliated Hospital of Zhejiang University: Department of Neurology
5. Moscow: Lomonosov Moscow State University, Department of Obstetrics and Gynaecology
6. Tübingen University Hospital: Department of Surgery / Disaster Medicine

Clinical Systems Medicine
1. Munich: Bavarian Academy for Addiction Problems in Research and Practice (BAS)

Neurosciences
1. Berlin Technical University: Biological Psychology and Neuroergonomics
2. Bonn University Hospital: Epileptology / Research Group Neuro-Economics
3. Göttingen University: Computational Neurosciences
4. Munich Technical University: Theoretical Physics
5. Ulm University: Neuroinformatics

Psychology
1. Ulm University: General Psychology
2. Darmstadt University of Technology: Sports Science

Environmental Sciences
1. Moscow: Dokuchaev Federal State Budget Institute of Soil Sciences: Soil Physics & Hydrology
2. Bielefeld University: School of Public Health, Chair of Environmental Medicine

Society and Economics
1. Kleve Rhine Waal University of Applied Sciences: Department of Economics / Game Theory
2. Düsseldorf University: School of Economics, Chair of Business Management, in particular Marketing