

**Fudan University, Shanghai, China**

# **BIG BRAIN 2022**

**Conference for Collaboration in EurAsia**

**Конференция по сотрудничеству в Евразии**

**2022 年亚欧地区合作会议**

**पूर्व-पाश्चात्य जीवविज्ञानम्-2022**

embedding

**Lomonosov Moscow State University's**

**БИОКУБЕРНЕТИКА      БИОКИБЕРНЕТИКА**

**Comprehensive Control for a People-centric  
Health and Medicine Across EurAsia**

**跨亚欧地区以人为本的健康和医疗的全面控制论**

## **Organizers**

**Fudan University, Shanghai, People's Republic of China**

**Shuhua XU** Center for Evolutionary Biology, School of Life Sciences

**Wenhua TIAN** School of Public Policy and Social Development

**Wei LIN** Research Institute of Intelligent Complex Systems

**Lomonosov Moscow State University**

**Faculty of Computational Mathematics and Cybernetics**

**Sergey I. MUKHIN , Sergey V. BOGOMOLOV**

**Heinrich Heine University Düsseldorf, Germany** Medical Faculty

**Jochen MAU**

**Scientific Team Yan LU , Lian DENG , Jing PU** School of Life Sciences

**VIRTUAL CONFERENCE**

**ACROSS SIX EURASIAN TIME ZONES**

**05-09 December 2022**



# **BIG BRAIN 2022**

## **Aims, Scope, and Goal**

### Conference background

Fudan's BIG BRAIN 2022 follows on BIG BRAIN 2019 at Lomonosov Moscow State University, the first successor to BIG BRAIN 2018 in Krefeld/Duesseldorf which had emerged from EURASIAN HEALTH & MEDICINE 2018 inspired by *One Continent, One Mission - Health in EurAsia* and realized with Guangdong Province at SUSTech.

### Aims

Advance scientific collaboration of long term to unleash this outstanding potential,  
**BIG BRAIN "EurAsia's Young Science - Talented & Ambitious",**  
on challenging research topics for lasting academic careers to benefit their own people.

### Scope

Integration of system sciences for comprehensive research on human-body physiology and person's behavior across variant EurAsian settings from a viewpoint of multi-scale control of internal dynamics under permanent exchange with and impact from its surroundings.

### Simpler language

That people's life-sphere settings vary in many aspects across EurAsia's regions is common knowledge, but this is falsely seen as inconvenient, a nuisance, by some. Systematic variation is a valuable source of insight in experimental work, and so is variation of life-sphere exposures a most valuable pathway to study physiological processes and person's behavioral decision in people from different regions.

### Goal

Model the dynamics of internal processes and their controls for targeted medical interventions and optimal health preservation.

**With BIG BRAIN conferences, we are trying to find more scientists who can share this aspiration and wish to contribute their research.**

## **BIG BRAIN 2022**

### Scientific Advisors

acad CAS Guoping ZHAO	Shanghai	Cell Biology
acad CAS Li JIN	Shanghai	Human Genetics
acad CAS Zhiming MA	Beijing	Mathematics

### Program Committee

<b>Ferdinand BINKOFSKI</b>	Aachen	Clinical Neuroscience
<b>Sergey BOGOMOLOV</b>	Moscow	Stochastic Micro-Macro Modeling
<b>Juergen HESCHELER</b>	Cologne	Stem Cell Research
<b>Ljiljana KOLAR-ANIĆ</b>	Belgrade	Physical Chemistry
<b>Wei LIN</b>	Shanghai	Intelligent Complex Systems
<b>Sergey MUKHIN</b>	Moscow	Multi-Scale Bio-Mathematics
<b>Ramakrishnan SWAMINATHAN</b>	Chennai	Bio-medical Engineering
<b>Wenhua TIAN</b>	Shanghai	Health Service Management
<b>Guanyu WANG</b>	Shenzhen	Mathematical Biology
<b>Shuhua XU</b>	Shanghai	Population Genetics
<b>Jianhua ZHANG</b>	Oslo	Artificial Intelligence

### **Daily Time Frames in December 2022 (only for orientation)**

China	12:00	14:00	16:00	18:00	20:00
Astana	10:00	12:00	14:00	16:00	18:00
India	09:30	11:30	13:30	15:30	17:30
Samara	08:00	10:00	12:00	14:00	16:00
Moscow	07:00	09:00	11:00	13:00	15:00
Central European Winter Time		07:00	09:00	11:00	13:00

### **Contacts**

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Sergey BOGOMOLOV   e-mail: bogomo(at)cs.msu.ru

Jochen Mau                      e-mail: j.mau(at)hhu.de

# BIG BRAIN 2022

## OPENING ADDRESSES

acad CAS **Li JIN**

President of Fudan University

acad RAS **Igor A. SOKOLOV**

Dean of Faculty of Computational Mathematics and Cybernetics,  
Lomonosov Moscow State University

**Xinhua LIN**

Dean of School of Life Sciences,  
Fudan University

## Structured List of Scientific Talks

### PART I: THEORIES

1. Stochastic Modeling of Hierarchical Models S. V. Bogomolov (Lomonosov Moscow State University)
2. Simplification of High-dimensional Multi-tempo Dynamic Models L.J. Zhang (Shandong University of Science and Technology), E. Shchepakina, V. Sobolev (Samara National Research University)
3. Allostasis and Allostatic Load: Emerging Paradigms at the Verge between Health and Disease J. W. Dietrich (Ruhr University Bochum)

### PART II: PERSON'S LIFE-SPHERE Person's Body Biosphere

#### Cellular System

4. Pluripotent Stem Cells for Basic Research and Regenerative Medicine: What Can We Learn About Embryonic Development? J. Hescheler (University of Cologne)
5. Systems Approach and Control Science Explain the Origin of Aging and its Possible Reversibility A. Khalyavkin (Emanuel Institute of Biochemical Physics of RAS; Federal Research Center "Computer Science and Control" of RAS)
6. Mathematical Model of Oscillatory Motion of Chromosomes During Meta- and Anaphase A. Hedrih (Serbian Academy of Sciences and Arts)
7. Cross-Talk Between Haematopoietic Cells and Fibroblast Subsets Drives Inflammation and Remodelling of the Bone Marrow Microenvironment in Myeloproliferative Neoplasms GL Wang (Fudan University)
8. Mutations as Activators of Biological Evolution Processes at Genomic and Population Levels A. Sidorova, N. Levashova, A. Garaeva, V. Tverdislov (Lomonosov Moscow State University)

# Fudan On-line Conference 05 - 09 Dec 2022 across EuraAsian Time Zones

## **BIG BRAIN 2022**

9. Mapping of Cell Membrane Proteome S. Arjunan (Ramaiah University of Applied Sciences, Bangalore, India)

### ***Cancer Models***

10. Optimal Strategies for Two-stage Combined Treatment of Blood Cancer N.L. Grigorenko, E.N. Khailov, E.V. Grigorieva, A.D. Klimenkova (Lomonosov Moscow State University)
11. Mathematical Model of Cancer Infusion Parabolic System With Nonlocal Diffusion L. Shangeranesh (National Institute of Technology Goa), J. Manimaran (Visvesvaya National Institute of Technology)
12. Quantitative function analysis of T-cell activity using large-scale metabolic model Jian Li (University Bonn)

### **Physiological Vital Functions**

#### ***Vascular System***

13. The Quasi-one-dimensional Model of the Lymph Flow in the Human Lymphatic System. Introduction. A. Mozokhina (Peoples' Friendship University of Russia), S Mukhin (Lomonosov Moscow State University)
14. Quasi-one-dimensional Mathematical Modeling of Blood Flow in General and Some Applications M. Abakumov, A. Bunicheva, A. Khrulenko, E. Kochetov, V. Kubyshev, S. Mukhin, K. Mysova, A. Pokladuk, N. Sosnin (Lomonosov Moscow State University)
15. Modeling of Building a Neural Network for Diagnosing Blood Flow Disorders Bunicheva A. Y., Kochetov E. V., Mukhin S. I. (Lomonosov Moscow State University)
16. Modeling of Glucose and Insulin Regulation Within the Framework of a Self-consistent Model of the Cardiovascular System A. B. Khrulenko, S. I. Mukhin, K. M. Mysova, A. Yu. Pokladuk (Lomonosov Moscow State University)

#### ***Hormone System***

17. An Integrate-and-Fire Mechanism for Modeling Rhythmicity in the Neuroendocrine System A. N. Churilov (St. Petersburg State University), J. Milton (The Claremont Colleges)
18. Systems Endocrinology: Perspectives of Precision Medicine Based on Physiological Evidence J.W. Dietrich (Ruhr University Bochum)
19. Kinetic Network Modelling of the Hypothalamic-Pituitary-Adrenal (HPA) Dynamics Lj. Kolar-Anić, Ž. Čupić, A. Stanojević, S. Maćešić, M. Andjelković (University of Belgrade), V. Vukojević (Karolinska Institutet)
20. Physicochemical Aspects of Rhythmicity in Neuroendocrine Systems Ž. Čupić (University of Belgrade), V. Vukojević (Karolinska Institutet), Lj. Kolar-Anić (University of Belgrade)

#### ***Immune System***

21. Mathematical Modeling of Atherosclerosis G. Abi Younes (Université de Lyon), N. El Khatib (Lebanese American University) V. Volpert et al. (Université de Lyon; Peoples' Friendship University of Russia)

# **BIG BRAIN 2022**

## **Operational Brain Functions**

### ***Brain Function Development***

22. Data driven exploration of human brain development XM Zhao (Fudan University)

### ***Motor Brain Functions***

23. Dynamic Excitatory-Inhibitory Homeostasis and Energy Supply in the Primary Motor Cortex H. J. Patel, CH. Choi, F. Binkofski (RWTH Aachen University; Research Center Juelich GmbH)

### ***Sensory System***

24. A Geometric Approach to Visual Perception - An Overview V.N. Kozlov (Lomonosov Moscow State University)

### ***Mental Workload***

25. EEG-based Prediction of Operator Functional State Using Evolutionary Fuzzy Rule-based Models J. Zhang (Oslo Metropolitan University)

26. Cross-task Cognitive Workload Recognition Based on Spatial-Frequency Feature Abstractions of the EEG Signals Z. Yin (University of Shanghai for Science and Technology)

### ***Emotions***

27. Emotion Recognition in Highly Source-localized EEG Signals Using Motif Patterns with Imbalanced Data N. Ganapathy (Indian Institute of Technology Hyderabad), H. Kumar, R. Swaminathan (Indian Institute of Technology Madras)

28. EEG based Emotion Recognition Using Entropy Features and Bayesian Optimized Random Forest H. Kumar, N. Ganapathy (Indian Institute of Technology Hyderabad), R. Swaminathan (Indian Institute of Technology Madras)

### ***Functional Impairment***

29. Non-coding Regulatory Element: Multiomics Analysis and Association with Brain Disorders YC Yang (Fudan University)

30. Investigations on the Brain Sub-anatomic Patterns for Early Diagnosis of Mild Cognitive Impairment R. Palanisamy, R. Swaminathan (Indian Institute of Technology Madras)

31. Uncovering the Missing Genetic Links of Neuropsychiatric Disorders JQ Chen (Fudan University)

## **Person's Eco-Sphere Exposures**

### ***Living-nature Cohabitation***

32. Soil and Human Health: A Review of Modeling Approaches N. Vasilyeva (Dokuchaev Soil Science Institute)

## **BIG BRAIN 2022**

33. Epidemic Basic Ratio Index and Ways to Evaluate It A. N. Gerasimov (Sechenov University)

34. On Control of Major Outbreaks of SARS-CoV-2 in China 2020 and 2022 J. Mau (Heinrich Heine University Duesseldorf), WH. Tian (Fudan University)

### ***Environmental Health Impacts***

35. Machine Learning Model for Preterm Birth Prediction Based on Prenatal Examination and Environmental Exposure During Pregnancy Q Sun (China-Japan Friendship Hospital, Beijing), JB Lu (National Research Institute for Family Planning, Beijing)

## **Person's Socio-Sphere Exposures**

### **Population Factors**

36. The Impact of Genetic Admixture on Human Diversity in Asia SH Xu (Fudan University)

37. Reconstructing Human Population History With Advances of Ancient Genomes K. Wang (Fudan University)

63 Archaic Ancestry: Across Populations and Within Genomes L. Chen (Fudan University)

38. Genetics of Human Complex Traits J. Yang (Westlake University)

39. Cancer patients in different regions need more customized treatment Q. Mei (Tongji University Hospital, Wuhan; Shanxi Bethune Hospital, Shanxi Academy of Medical Sciences)

### **Social Embedding with Societal Framing Factors**

#### ***Health Systems Context***

40. Healthcare Systems in Transition - the Challenge of Complexity and Dynamics R. Sibbel (Frankfurt School of Finance & Management)

41. An Overview of the Health Care System in Kazakhstan from an Individual's Perspective A. Nurgozhaev (Med Invest First Ltd. Health Care Consulting, Astana)

42. Health System in Shanghai, a Municipality Directly Under Central Government, China WH Tian (Fudan University)

## **PART III: TECHNOLOGIES AND METHODOLOGIES**

### **Engineering**

43. Slow/Fast Dynamic Models with Applications to Engineering Problems S. Sazhin (University of Brighton), E. Shchepakina, V. Sobolev (Samara National Research University)

### ***Biomedical Engineering***

44. **Comparative Efficiency of the Physical Sensory Principles in Microbiological Express-Analysis** T.M. Zimina, N.O. Sitkov (St. Petersburg Electrotechnical University “LETI“), L.A. Kraeva (Petersburg Institute of Epidemiology and Microbiology), V.E. Lemozerskii (St. Petersburg Electrotechnical University “LETI“), A. F. Kostko (ITMO University)

## **Information Sciences**

### ***Computing Methods***

45. **Modeling (Engineering) Processes Without Modeling Sequences** S. Vogel (Hochschule Ravensburg-Weingarten University of Applied Sciences)
46. **SVision: A Deep Learning Approach to Resolve Complex Structural Variants** K. Ye (Xi’an Jiaotong University)
47. **Practical Features of Coronary Flow Simulations for the Patients Undergoing Percutaneous Coronary Intervention** S. Simakov (Moscow Institute of Physics and Technology), T. Gamilov (Sechenov University), A. Danilov (Marchuk Institute of Numerical Mathematics RAS), A. Rebrova (Moscow Institute of Physics and Technology), Fuyou Liang (Shanghai Jiao Tong University)
48. **The Direct and Inverse MEG Problem** T.V. Zakharova, I.P. Pakhnenko, A.I. Sabirov (Lomonosov Moscow State University)

### ***Cellular Level Methods***

49. **Chiral Correspondences in Pharmacology** E. Semenova, E. Belova, V. Tverdislov (Lomonosov Moscow State University)
50. **Assessment of the Chirality of Regular and Irregular Protein Structures. Application in Bioengineering** A. Lutsenko, A. Sidorova, D. Shpigun, D. Lukyanenko (Lomonosov Moscow State University)
51. **SCALLOP Consortium: Exposing Causal Biomarkers for Complex Diseases Using Proteogenomics** X. Shen (Fudan University, Guangzhou)
52. **Localization of Secondary Structures in Proteins of Various Functional Classes** O. Bagrova, E. Belova, V. Tverdislov (Lomonosov Moscow State University)
53. **Model of 3-dimensional  $\alpha$ -Helix Structure Formation Based on Two-particle Model in Lennard-Jones Potential** N. Levashova, A. Sidorova, K. Zuev, V. Tverdislov (Lomonosov Moscow State University)
54. **Reuse of Genomic Data Discarded by Quality Controls: Examples on Identification of Cryptic Relatedness** CL Wang (Huazhong University of Science and Technology)

### ***Imaging***

- 55.Characterization of Fast Dynamical Processes in Live Cells via Massively Parallel Fluorescence Correlation Spectroscopy Integrated With Fluorescence Lifetime Imaging Microscopy (mpFCS/FLIM) S. Oasa (Karolinska Institutet), A.J. Krmpot, S.N. Nikolić (University of Belgrade), L. Terenius, R. Rigler, V. Vukojević (Karolinska Institutet)
- 56.Direct Numerical Modeling and Convolutional Neural Networks for Medical Ultrasound Problems I. Petrov, A. Vasyukov (Moscow Institute of Physics and Technology)

### **Data-Analytic Sciences**

- 57.Estimation of Adjusted Relative Risks in Log-binomial Regression S. Wagenpfeil, J. Schöpe, A. Bekhit (Saarland University)
- 58.Assessing the Bioequivalence of Different Drugs M.Dranitsyna, V.Klimenko, P.Panov, T.Zakharova (RUDN ; Lomonosov Moscow State University)

## **PART IV: FUTURE RESEARCH AND HEALTH POLICY DESIGN**

### ***Control of Internal Dynamics of Physiological Processes***

- 59.Disorders of Multi-scale Control GY. Wang (Chinese University of Hong Kong, Shenzhen)
- 60.Axiomatic Multi-scale Control in Hierarchical Functional Dynamics J. Mau (Heinrich Heine University Düsseldorf)

### ***Control of External Dynamics in Local Conditions***

- 61.From Theory to Transcontinental Validation – a BIG BRAIN Research Agenda J. Mau (Heinrich Heine University Düsseldorf)
- 62.Transcontinental Collaboration in Health and Academic Medicine Across EurAsia (EurAsian TCHAM) J. Mau (Heinrich Heine University Düsseldorf)

### ***Late additions***

- 63.Archaic Ancestry: Across Populations and Within Genomes L. Chen (Fudan University)