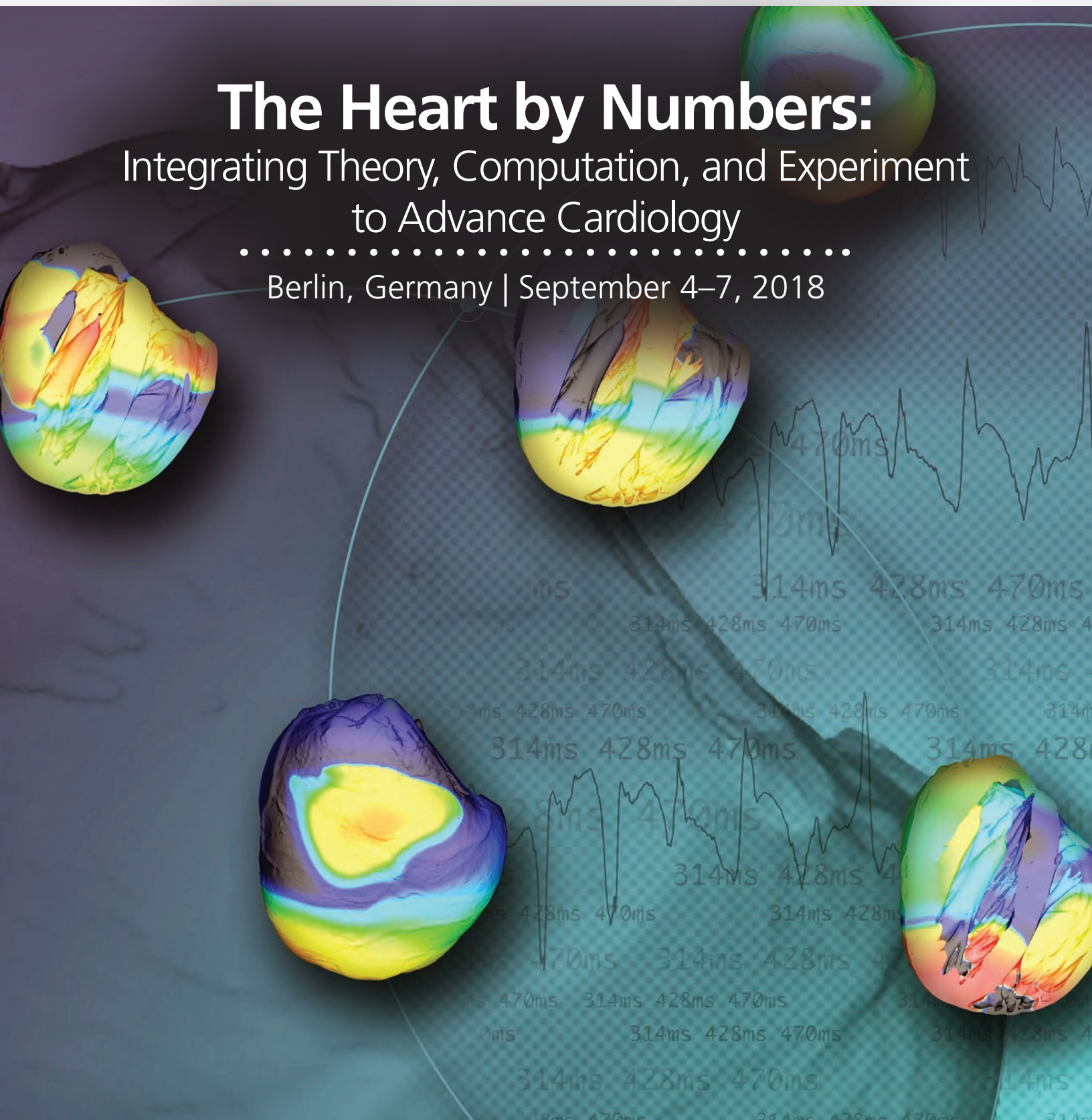


The Heart by Numbers:

Integrating Theory, Computation, and Experiment to Advance Cardiology

Berlin, Germany | September 4–7, 2018



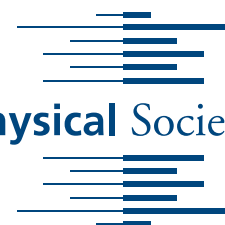
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 FÜR MOLEKULARE MEDIZIN
 IN DER HELMHOLTZ-GEMEINSCHAFT



Biophysical Society

Organizing Committee

Martin Falcke, Max Delbrück Center for Molecular Medicine, Germany
Gernot Plank, Medical University of Graz, Austria
Zhilin Qu, University of California, Los Angeles, USA
Karin Sipido, University of Leuven, Belgium
James Weiss, University of California, Los Angeles, USA

Scientific sessions will be held in Auditorium Axon I and poster sessions will be held in Building 84 Foyer unless otherwise noted.

Monday, September 3, 2018

17:30 – 20:00	Registration/Information	NH Collection Friedrichstrasse
18:00 – 20:00	Welcome Reception	NH Collection Friedrichstrasse

Tuesday, September 4, 2018

8:00 – 18:00	Registration/Information	Grand Foyer
8:45 - 9:00	Martin Lohse, Max Delbrück Center for Molecular Medicine, Germany <i>Opening Remarks</i>	

Session I

Disease Modelling I Martin Falcke, Max Delbrück Center for Molecular Medicine, Germany, Chair

9:00 - 9:35	Stefan Luther, Max Planck Institute for Dynamics and Self-Organization, Germany <i>Low-Energy Control of Cardiac Arrhythmias</i>	
9:35 - 10:10	Colleen Clancy, University of California, Davis, USA <i>Sex, Drugs, and Funky Rhythms: Cardiology Insights from Modeling and Simulation</i>	
10:10 - 10:30	Hermenegild Arevalo, Simula Research Laboratory, Norway * <i>Using Virtual Hearts Models to Investigate Arrhythmogenesis during Acute Myocardial Infarction</i>	
10:30 - 10:50	Marcus Kelm, German Heart Institute Berlin, Germany * <i>EurValve</i>	
10:50 - 11:10	Coffee Break.....	Grand Foyer

Session II

Disease Modelling II Martin Falcke, Max Delbrück Center for Molecular Medicine, Germany, Chair

11:10 - 11:45	Edward Vigmond, University of Bordeaux, France <i>Biophysical Models of the Fibrillating Atria: Fibrosis and Electrophysiological Considerations</i>	
11:45 - 12:20	Yohannes Shiferaw, California State University, Northridge, USA <i>Synchronization of Stochastic Calcium Waves in Atrial Tissue</i>	
12:20 - 13:25	Lunch Break.....	Grand Foyer
13:25 - 14:45	Poster Session I	Building 84 Foyer

Session III

Disease Modelling III Karin Sipido, University of Leuven, Belgium, Chair

14:45 - 15:20	Natalia Trayanova, Johns Hopkins University, USA <i>Computational Cardiology: Blending Engineering and Medicine</i>	
15:20 - 15:55	Steven Niederer, King's College London, United Kingdom <i>Clinical Translation of Cardiac Models</i>	
15:55 - 16:30	Emilia Entcheva, George Washington University, USA <i>Massively-Parallel All-Optical Cardiac Electrophysiology</i>	
16:30 - 16:50	Coffee Break.....	Grand Foyer

Session IV

Disease Modelling IV Karin Sipido, University of Leuven, Belgium, Chair

16:50 - 17:25	Martyn Nash, University of Auckland, New Zealand <i>Structure-Function Mechanisms of Heart Failure</i>	
17:25 - 18:00	Andrew McCulloch, University of California, San Diego, USA <i>Multi-Scale Biomechanics and Systems Mechanobiology of Heart Failure</i>	

Wednesday, September 5, 2018

8:30 - 17:50	Registration/Information	Grand Foyer
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Session V

Excitation Contraction Coupling I James Weiss, University of California, Los Angeles, USA, Chair

9:00 - 9:35	Julia Gorelik, Imperial College London, United Kingdom <i>Microdomain Specific Regulation of L-type Ca Channels and Arrhythmias</i>	
9:35 - 10:10	Alexandra Zahradnikova, Slovak Academy of Sciences, Slovakia <i>Allosteric Aspects of Ryanodine Receptor Gating</i>	
10:10 - 10:30	David J. Christini, Cornell University, USA * <i>Designing Intact Cardiac Cell Electrophysiological Protocols to Improve Computational Model Fidelity</i>	
10:30 - 10:50	Jamie I. Vandenberg, Victor Chang Cardiac Research Institute, Australia * <i>Impact of Correlated Gene Expression Patterns on Population Models of the Cardiac Action Potential</i>	
10:50 - 11:10	Coffee Break.....	Grand Foyer

Session VI

Metabolism & Mitochondria James Weiss, University of California, Los Angeles, USA, Chair

11:10 - 11:45	Daniel Beard, University of Michigan, USA <i>Elucidating Links Between Disruptions to Myocardial Energy Metabolism and Mechanical Dysfunction in Heart Failure</i>	
11:45 - 12:20	Brian O'Rourke, Johns Hopkins University, USA <i>Cascading Mitochondrial Network Failure: Computational and Experimental Studies</i>	
12:20 - 12:40	Zhen Song, University of California, Los Angeles, USA * <i>A Spatially Detailed in Silico Model of Excitation-Contraction-Metabolism Coupling of Cardiac Cells</i>	
12:40 - 13:10	Lunch Break.....	Grand Foyer
13:10 - 14:30	Poster Session II	Building 84 Foyer

Session VII

Excitation Contraction Coupling II Zhilin Qu, University of California, Los Angeles, USA, Chair

14:30 - 15:05	Daniela Panáková, Max Delbrück Center for Molecular Medicine, Germany <i>Wnt, L-type Calcium Channel, and the Developing Heart</i>	
15:05 - 15:40	Christian Soeller, University of Exeter, United Kingdom <i>Characterisation of Ryanodine Receptor Clusters in Cardiac Myocytes Using Quantitative Imaging Methods</i>	
15:40 - 16:00	Richard Clayton, University of Sheffield, United Kingdom * <i>Calibration of Human Atrial Cell Models Using Bayesian History Matching with Gaussian Process Emulators</i>	

Session VIII

Data Driven Modelling Zhilin Qu, University of California, Los Angeles, USA, Chair

16:00 - 16:55	Elizabeth Cherry, Rochester Institute of Technology, USA <i>Reconstructing Cardiac Electrical Dynamics Using Data Assimilation</i>	
16:55 - 17:30	Leonid Goubergrits, Charité – Universitätsmedizin Berlin, Germany <i>Modelling and Simulation for the Aortic Valve Treatment Planning Using Image-based CFD</i>	
17:30 - 17:50	Juan Carlos del Alamo, University of California, San Diego, USA * <i>Patient-specific Mapping of Blood Stasis in the Left Atrium by Computational Fluid Dynamics</i>	

Thursday, September 6, 2018

8:30 - 14:50	Registration/Information	Grand Foyer
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Session IX

Arrhythmogenesis and Its Control I Gernot Plank, Medical University of Graz, Austria, Chair

9:00 - 9:35	Martin Bishop, King's College London, United Kingdom <i>Identifying the Arrhythmogenic Mechanisms Driven by Midwall Fibrosis in Non-Ischemic Dilated Cardiomyopathy</i>	
9:35 - 10:10	Jonathan Lederer, University of Maryland, USA <i>Diastolic Calcium in Heart: CA²⁺ Quarjs, CA²⁺ Sparks, CA²⁺ Waves and Arrhythmias</i>	
10:10 - 10:30	Johann Schredelseker, Ludwig-Maximilians-University of Munich, Germany * <i>Activation of Mitochondrial Calcium Uptake Suppresses Arrhythmogenesis in Cardiomyocytes</i>	
10:30 - 10:50	Michael B. Liu, University of California, Los Angeles, USA * <i>Arrhythmogenesis in Long QT Syndrome: Mechanism of Initiation and Therapeutic Insight from an in Silico Human Model</i>	

10:50 - 11:10	Coffee BreakGrand Foyer
Session X	Arrhythmogenesis and Its Control II Gernot Plank, Medical University of Graz, Austria, Chair
11:10 - 11:45	Donald Bers, University of California, Davis, USA <i>Cardiac Excitation-Contraction Coupling, Arrhythmias and Signaling: Experiments and Modelling</i>
11:45 - 12:20	Alexander Panfilov, Gent University, Belgium <i>In Silico-in vitro Approach to Study the Mechanisms of Cardiac Arrhythmias</i>
12:20 - 12:40	Vivian Timmermann, Simula Research Laboratory, Norway * <i>A Computational Study of the Contribution of Mechano-Electric Feedback to Arrhythmogenic Current Generation</i>
12:40 - 13:00	Fernando O. Campos, King's College London, United Kingdom * <i>Optimization of an Activation-Repolarization Time Metric to Detect Localized Susceptibility to Reentry</i>
13:00 - 13:30	Lunch BreakGrand Foyer
13:30 - 14:50	Poster Session III Building 84 Foyer
14:50 - 18:00	Free Time
18:00 - 21:00	Boat Trip/Banquet Station: Märkisches Ufer

Friday, September 7, 2018

8:30 - 15:30	Registration/InformationGrand Foyer
Session XI	Excitation Contraction Coupling III David J. Christini, Cornell University, USA, Chair
9:00 - 9:35	Pieter de Tombe, Loyola University Chicago, USA <i>Frank-Starling Law of the Heart: Molecular Mechanisms of Myofilament Length Dependent Activation</i>
9:35 - 10:10	Michael Gotthardt, Max Delbrück Center for Molecular Medicine, Germany <i>Theory and Practice of Titin Based Mechanotransduction</i>
10:10 - 10:30	Kenneth Campbell, University of Kentucky, USA * <i>Force-Dependent Recruitment of Cross-bridges from the Myosin Off-state Can Contribute to Length-dependent Activation in Cardiac Muscle</i>
10:30 - 10:50	Lorenzo Marcucci, University of Padova, Italy * <i>Proposed Mechanism of Length Dependent Maximum Force Developed in Striated Muscle at High Calcium</i>
10:50 - 11:10	Coffee BreakGrand Foyer
Session XII	Excitation Contraction Coupling IV David J. Christini, Cornell University, USA, Chair
11:10 - 11:45	Mary Maleckar, Allen Institute for Cell Science, USA <i>Modeling Experimental Insights from hiPSC and Derived Cells: Integrating the Cardiomyocyte</i>
11:45 - 12:20	Frank Heinzel, Charité – Universitätsmedizin Berlin, Germany <i>Regulation of Subcellular Ca²⁺ as Source of Intracellular Dyssynchrony in Cardiomyocytes</i>
12:20 - 12:40	Samuel Wall, Simula Research Laboratory, Norway * <i>In Silico Modeling of Cardiac Microphysiological Systems for Evaluating Drug Side Effects</i>
12:40 - 13:20	Lunch BreakGrand Foyer
Session XIII	Excitation Contraction Coupling V Markus Bär, Physikalisch-Technische Bundesanstalt, Germany, Chair
13:20 - 13:55	Peter Kohl, Institute for Experimental Cardiovascular Medicine, Germany <i>Sat-Nav for the Inner Cities of the Heart: Mapping 3D Cell-Nanostructure</i>
13:55 - 14:15	Enrique Alvarez-Lacalle, Polytechnic University of Catalonia, Spain * <i>A General Equilibrium Model to Study Intracellular Calcium Homeostasis. New Insights on Ventricular Function</i>
14:15 - 14:35	Coffee BreakGrand Foyer
Session XIV	Re-Entry Markus Bär, Physikalisch-Technische Bundesanstalt, Germany, Chair
14:35 - 14:55	Vladimir Zykov, Max Planck Institute for Dynamics and Self-Organization, Germany * <i>Fast Propagation Regions of a Specific Geometry can Cause Reentry in Excitable Media</i>
14:55 - 15:15	Michael Colman, University of Leeds, United Kingdom * <i>Dynamic Organ-scale Modelling of Sub-cellular Calcium Release Events in the Heart: After-Depolarisations, Premature Excitation and Re-Entry</i>
15:15 - 15:30	Martin Falcke, Max Delbrück Center for Molecular Medicine, Germany <i>Closing Remarks and Biophysical Journal Poster Awards</i>