

10th TRM Forum on Computer Simulation and Experimental Assessment of Cardiac Function

Lugano, December 8-10, 2019



Towards the Digital Twin

Sponsored by the Theo-Rossi-di-Montelera (TRM) Foundation
Forum Organizers: Nathalie Virag and Lukas Kappenberger

In collaboration with Center for Computational Medicine in Cardiology (CCMC)
(Rolf Krause, Angelo Auricchio and Frits Prinzen)



SUNDAY DECEMBER 8, 2019

18h30-21h30 **Welcome drink and dinner at Villa Castagnola (invitation only)**

MONDAY DECEMBER 9, 2019

08h30-09h00 **Welcome and Introduction**

Nathalie Virag (TRM Foundation)

Prof. Patrick Gagliardini (Pro-Rector at Università della Svizzera italiana)

Angelo Auricchio & Rolf Krause (Center for Computational Medicine in Cardiology)



Cardiac cellular modeling & Experimental data

Session Chairs: Lukas Kappenberger & Pyotr Platonov

09h00-09h20 **(Digital) Twin sodium channels in the heart and the negative dominance of $Na_v1.5$ mutations**
Jan Kucera, Bern, Switzerland

09h20-09h40 **Non-canonical roles of cardiac macrophages**
Peter Kohl, Freiburg, Germany

09h40-10h00 **The cardiac sodium channel $Na_v1.5$: high-resolution cell biology and mutation-induced biophysical alterations**
Hugues Abriel, Bern, Switzerland

10h00-10h15 **Moderated discussion**

10h15-10h45 **Coffee break**

Cardiac tissue and fluid structure modeling & Experimental data

Session Chairs: Rolf Krause & Vincent Jacquemet

10h45-11h05 **Coupling monodomain and eikonal models for efficient identification of scars**
Martin Weiser, Berlin, Germany

11h05-11h25 **Beta-adrenergic stimulation versus stretch: insights from a novel electromechanical cardiomyocyte model**
Aurore Lyon, Maastricht, The Netherlands

11h25-11h45 **Fluid-structure interaction computational models of the bioprosthetic aortic valves**
Maria Nestola, Lugano, Switzerland

11h45-12h00 **Moderated discussion**

12h00-13h30 **Lunch break and moderated posters session**

Atrial modeling & Experimental data

Session Chairs: Angelo Auricchio & Axel Loewe

- 13h30-13h50 **Variability in atrial fibrillation electrograms properties and propagation patterns**
Uli Schotten, Maastricht, The Netherlands
- 13h50-14h10 **Atrial fibrillation in monogenic cardiomyopathies: a phenotype feature or a risk marker**
Pyotr Platonov, Lund, Sweden
- 14h10-14h30 **A second look at interconnected cable models of atrial tissue**
Vincent Jacquemet, Montreal, Canada
- 14h30-14h45 **Moderated discussion**
- 14h45-15h15 **Coffee break**

Ventricular modeling & Experimental data

Session Chairs: Peter Kohl & Steven Niederer

- 15h15-15h35 **Multi-scale modeling of a novel therapeutic approach to heart failure**
Andrew McCulloch, San Diego, USA
- 15h35-15h55 **Pacing and reentry in the Purkinje system**
Ed Vigmond, Bordeaux, France
- 15h55-16h15 **Towards model-enriched measurements of electro-mechanics**
Frits Prinzen, Maastricht, The Netherlands
- 16h15-16h30 **Moderated discussion**
- 18h30 **Meet in the lobby of Villa Castagnola for departure to dinner (open to all participants)**

TUESDAY DECEMBER 10, 2019

08h30-08h40 **Welcome and Introduction**
Lukas Kappenberger (TRM Foundation)
Tiziano Moccetti (Cardiocentro Ticino)



Personalized modeling & Artificial Intelligence

Session Chairs: Frits Prinzen & Gernot Plank

- 08h40-09h00 **Personalised modeling of cardiac electro-mechanics in arrhythmogenic cardiomyopathy**
Joost Lumens, Maastricht, The Netherlands
- 09h00-09h20 **Patient-specific computer models of action potential derived from functional and molecular data**
Igor Efimov, St Louis, USA
- 09h20-09h40 **Artificial Intelligence and computational cardiology: learning by heart**
Maxime Sermesant, Nice, France
- 09h40-09h55 **Moderated discussion**
- 09h55-10h30 **Coffee break**

Translational cardiology & in silico trials

Session Chairs: Nathalie Virag & Aurore Lyon

- 10h30-10h50 **A machine learning-based tool for guiding cardiac resynchronisation therapy**
Valeriya Naumova, Oslo, Norway
- 10h50-11h10 **Successes and challenges in translational computational cardiology**
Natalia Trayanova, Baltimore, USA
- 11h10-11h30 **Extending human in silico trials for drug cardiac safety and efficacy assessment of contractility and pro-arrhythmic risk**
Blanca Rodriguez, Oxford, UK
- 11h30-11h45 **Moderated discussion**
- 11h45-13h00 **Lunch break and posters**

Towards the digital twin

Session Chairs: Natalia Trayanova & Andrew Mc Culloch

- 13h00-13h20 **Towards the digital biomechanical twin: the inverse problem of cardiac mechanics**
Axel Loewe, Karlsruhe, Germany
- 13h20-13h40 **How do we scale the cardiac digital twin?**
Steven Niederer, London, UK
- 13h40-14h00 **Automated workflow for digital twinning of cardiac electro-mechanical function**
Gernot Plank, Graz, Austria
- 14h00-14h15 **Moderated discussion**
- 14h15-14h45 **Coffee break**

Special session in memoriam of Adriaan van Oosterom

Session Chairs: Lukas Kappenberger & Fred Lindemans

- 14h45-15h00 **From Willem to Adriaan: a short history of the ECG**
Lukas Kappenberger (TRM Foundation)
- 15h00-15h20 **Anatomical based detection of bundle branch block and Brugada from the standard ECG**
Peter van Dam, Arnhem, The Netherlands
- 15h20-15h40 **Out-of-the-box vectorcardiogram**
Tammo Delhaas, Maastricht, The Netherlands
- 15h40-16h00 **Fast and accurate reconstruction of transmural activation maps from standard 12-lead ECG using an eikonal model**
Simone Pezzuto, Lugano, Switzerland
- 16h00-16h15 **Moderated discussion**

16h15-16h45 **Special speaker for 10th edition of TRM forum**
All science is simulation
Fred Lindemans

16h45 **Address to Forum**
Prof. Boas Erez (Rector at Università della Svizzera italiana)

Tribute to TRM
Lukas Kappenberger
Nathalie Virag

18h30 **Meet in the lobby of Villa Castagnola for departure to dinner (invitation only)**

10TH EDITION – TRM FORUM

FORUM ORGANIZERS



Lukas Kappenberger
TRM Foundation



Nathalie Virag
TRM Foundation

LOCAL HOSTS



Angelo Auricchio
CCT Lugano, Switzerland



Frits Prinzen
Maastricht, The Netherlands



Rolf Krause
CCMC Lugano, Switzerland

UNIVERSITÀ DELLA SVIZZERA ITALIANA



Boas Erez
Rector
Lugano, Switzerland



Patrick Gagliardini
Pro-Rector
Lugano, Switzerland



Tiziano Moccetti
Senior Medical Director
Lugano, Switzerland

FONDAZIONE CARDIOCENTRO TICINO

FACULTY



Hugues Abriel
Bern, Switzerland



Tammo Delhaas
Maastricht, The Netherlands



Igor Efimov
St. Louis, USA



Vincent Jacquemet
Montreal, Canada



Peter Kohl
Freiburg, Germany



Jan Kucera
Bern, Switzerland



Fred Lindemans
Sittard, The Netherlands



Axel Loewe
Karlsruhe, Germany



Joost Lumens
Maastricht, The Netherlands



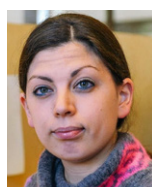
Aurore Lyon
Maastricht, The Netherlands



Andrew McCulloch
San Diego, USA



Valeriya Naumova
Oslo, Norway



Maria Nestola
Lugano, Switzerland



Steven Niederer
London, UK



Simone Pezzuto
Lugano, Switzerland



Gernot Plank
Graz, Austria



Pyotr Platonov
Lund, Sweden



Blanca Rodriguez
Oxford, UK



Uli Schotten
Maastricht, The Netherlands



Maxime Sermesant
Nice, France



Natalia Trayanova
Baltimore, USA



Peter van Dam
Arnhem, The Netherlands



Edward Vigmond
Bordeaux, France

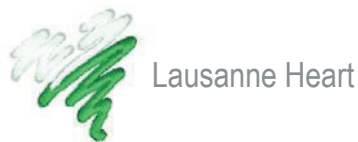


Martin Weiser
Berlin, Germany

SPONSOR & FORUM ORGANIZERS

This Forum is sponsored by the Theo-Rossi-di-Montelera (TRM) Foundation, thanks to the generosity and "avant-garde" spirit of late Contessa Ida Rossi di Montelera.

It is organized by Prof. Lukas Kappenberger (president TRM foundation) and Dr. Nathalie Virag (member TRM foundation) from the Lausanne Heart Group.



It is hosted by the Università della Svizzera Italiana (USI) and the Cardiocentro Ticino (CCT) and by The Center for Computational Medicine in Cardiology



VENUE

The TRM forum will be held in Lugano. Presentations and discussions will take place in the main lecture hall "Aula Magna" on the campus of USI. The Aula is a mostly underground structure illuminated through glass ceilings, adjacent to the University's main building.



HOTEL

Speakers will stay at the Grand Hotel Villa Castagnola. It is a 10-15 minutes walking distance to USI.

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2017 EDITION



TRAVEL

BY AIR

Milano Malpensa airport can be reached from Lugano in about 70 minutes by shuttle buses. Lugano Servizi SA and Morandi (<http://www.luganoservices.ch>), offer daily regular bus-connections from Lugano FFS-Piazzale Besso and Chiasso Station to / from the airport of Milano Malpensa.

There is also a train connection (www.sbb.ch/en/timetable). This service runs daily every hour from 5 a.m. to 11 p.m. with stops at all regional train stations. It takes approximately 90 minutes from Malpensa T1 airport to Lugano railway station.

BY TRAIN

There are direct trains between Lugano and Milan (1 hour), Zürich (3 hours), and Basel (4 hours).

FROM THE RAILWAY STATION TO THE CITY/HOTELS/USI

From the railway station, the downtown area can be reached by the cable car (funicolare) or by buses line 2 (from the city side of the station) and line 3 (from Piazzale di Besso). The university campus can be reached by bus line 6, which has its stop at the city side of the station. There is a taxi stand on the city side (southeast) of the railway station.



