# First International Summer Institute on Network Physiology (ISINP)

Lake Como School of Advanced Studies - July 24-29, 2017

## Home

The human organism is an integrated network, where multi-component organ systems, each with its own regulatory mechanism, continuously interact to coordinate their function. Physiological interactions occur at multiple levels and spatio-temporal scales to produce distinct physiologic states, e.g. wake and sleep, consciousness and unconsciousness. Disrupting organ communications can lead to dysfunction of individual systems or collapse of the entire organism, as observed under clinical conditions such as sepsis, coma and multiple organ failure. Yet, despite its importance to basic physiologic functions, the nature of interactions between diverse organ systems and sub-systems, and their collective role in maintaining health is not known. Further, there are no adequate analytic tools and theoretical framework to probe these interactions.

Despite the vast progress and achievements in systems biology and integrative physiology in the last decades, we do not know the basic principles and mechanisms through which diverse physiological systems and organs dynamically interact and integrate their functions to generate a variety of physiologic states at the organism level.

The emerging new interdisciplinary field of *Network Physiology* aims to address this fundamental question. In addition to defining health and disease through structural, dynamical and regulatory changes in individual physiological systems, the new conceptual framework of Network Physiology focuses on the coordination and network interactions among diverse organ systems and sub-systems as a hallmark of physiologic state and function.

Novel concepts and approaches derived from recent advances in network theory, coupled dynamical systems, statistical and computational physics, signal processing and biological engineering show promise to provide new insights into the complexity of physiological structure and function in health and disease, bridging sub-cellular level signaling with inter-cellular interactions and communications among integrated organ systems and sub-systems. These advances form first building blocks in the methodological formalism and theoretical framework necessary to address the problems and challenges in the field of Network Physiology.

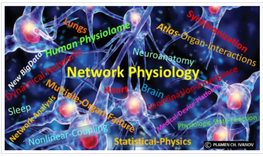



**Figure.** Lake Como International Summer Institute to focus on challenges, frontiers and future developments in the emerging field of Network Physiology.

This international summer institute will integrate empirical and theoretical knowledge across disciplines with the aim to understand in different contexts, from extensive data analysis and modeling approaches to clinical practice, how diverse physiological systems and sub-systems dynamically interact to produce health and disease.

This will be an interactive event with lectures ranging from physics and applied mathematics to neuroscience, physiology and medicine, covering a range of physiological systems from the cellular to the organ level, and will discuss the challenges, current frontiers and future developments in the emerging field of Network Physiology.

Presentations on basic research will be combined with lectures by leading physiologists and clinicians, working with large medical and ICU databases.

This International Summer Institute aims to provide a relaxed setting where lecturers and attendees interact throughout the course of the week. We have speakers, prominent leaders in their respective fields, who will present new directions in the theory of networks of dynamical systems, brain and neuronal dynamics, tissues and cell assemblies, pair-wise and network interactions of organ systems and sub-systems, and advanced methods from non-linear dynamics and synchronization phenomena.

The Summer Institute will address a diverse audience of graduate students, postdoctoral fellows, research scientists and faculty across a broad range of disciplines and fields from physics, applied mathematics and biomedical engineering to neuroscience, physiology and clinical medicine.

We look forward to meeting you in Como!

*Plamen Ch. Ivanov*
*Summer Institute Organizer and Director*

**Course Language: English**

This international institute builds on groundbreaking research in Network Physiology that has been made possible by support from the W.M. Keck Foundation.

**This international institute is supported by**

**Fondazione Alessandro Volta**

**Physiological Measurement**
**An interdisciplinary journal that covers the quantitative measurement and visualization of physiological structure and function in clinical research and practice, with an emphasis on the development of new methods of measurement and their validation.**

**Europhysics Letters**
**A letters journal exploring the frontiers of physics**

**The European Physical Society**
**A federation of 41 National Physical Societies in Europe, with members from all fields of physics, and European research institutions, focusing on issues of concern to all European countries relating to physics research, science policy and education.**

**Guger Technologies**
**g.tec is a growing enterprise for biomedical devices with focus on Brain-Computer interface and now sells its systems and products in more than 60 countries worldwide. All hardware and software development is done in-house by a team of researchers, engineers and developers. g.tec is also an active member in a number of national and international research projects and is active in scientific publishing.**

**Moberg Research, Inc.**
**Moberg products integrate physiological and medical information to support decision-making that transforms neurocritical care.**

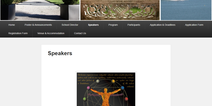
**IOP Publishing**
**More than a physics publisher.**

**IPEM**
**IPEM is the Learned Society and professional organisation for physicists, clinical and biomedical engineers and technologists working in medicine and biology.**

# First International Summer Institute on Network Physiology (ISINP)

Lake Como School of Advanced Studies - July 24-29, 2017





## Speakers



**Aurora R. Bernardi**

Dr. Aurora R. Bernardi graduated in Economics. Germany where he received a PhD degree in theoretical physics in 1991, and from the Italian Order of Journalists. Bernardi worked for the RAI in 2002 and 2006 he was a semi-professional footballer in the Italian Serie A and Serie B championships. Since 2006 to 2012, she was part of the Board of the Bank of the same Italian city as Institute in Valdarno. In April 2014, Dr. Bernardi joined the Physics Department of the University of Pisa, where she is a Research Associate.

Bernardi, PhD, Bernardi, Dr. Bernardi, Bernardi, Bernardi,

# First International Summer Institute on Network Physiology (ISINP)

Lake Como School of Advanced Studies - July 24-29, 2017

## Program

**Scientific Program**
(download PDF here)

| day/time | Monday 24/7 | Tuesday 25/7 | Wednesday 26/7 | Thursday 27/7 | Friday 28/7 | Saturday 29/7 |
|---|---|---|---|---|---|---|
| 8:00 | Registration | —— | —— | —— | —— | —— |
| 8:45 | Opening | —— | —— | —— | —— | —— |
| 9:00 | Ivanov | Moorman | Buchman | Bullmore | Bullmore | Penzel |
| 9:55 | Buchman | Bodenschatz | Suki | Pecora | Lehnertz | Stoop |
| 10:50 | Tea Break | Tea Break | Tea Break | Tea Break | Tea Break | Tea Break |
| 11:20 | La Porta<br>Zapperi | Scala | Stramaglia | Lehnertz | Malberg | Suki |
| 12:15 - 12:45 | Lunch Break | g.tec – Guger Technologies | Moberg Research, Inc<br>ICU solutions | Lunch Break | Lunch Break | Closing<br>(12:15 - 12:35) |
| 12:45 - 14:30 | Lunch Break | Lunch Break | Lunch Break | Lunch Break | Lunch Break | |
| 14:30 | Moorman | Stoop | Penzel | Pikovsky | Pikovsky | |
| 15:25 | Pecora | Boccaletti | Bartsch | Rosenblum | Rosenblum | |
| 16:20 | Coffee Break | Coffee Break | Coffee Break | Coffee Break | Coffee Break | |
| 16:40 | Boccaletti | Gorbach | Malberg | Kang Liu | Faes | |
| 17:35 - 18:30 | Round Table Discussion | Poster Session<br>(17:35 - 19:00) | Poster Session<br>(17:35 - 19:00) | Round Table Discussion | 19:00 Concert<br>20:30 Dinner | |

Time for each lecture is 45 min, followed by 10 min questions and discussions.

Program-Timetable-1July2017

**Round Table Discussion I Panel**:
Timothy G. Buchman, J. Randall Moorman, Dick Moberg, Begonya Otal, Hagen Malberg, Eberhard Bodenschatz, Louis Pecora, Andras Eke

**Round Table Discussion II Panel**:
Edward T. Bullmore, Klaus Lehnertz, Arkady S. Pikovsky, Ruedi Stoop, Thomas Penzel , Michael G.Rosenblum, Béla Suki, Alexander Gorbach

## Lecture titles

**Ronny P. Bartsch**
1. Novel time-delay stability approach to infer coupling in systems with bursting dynamics and to identify networks of organ interactions.

**Stefano Boccaletti**
1. Parenclitic Networks: How to Uncover New Functions and Structural Information in Biological Data.
2. Smooth and Explosive Synchronization of Networked Dynamical Units.

**Eberhard Bodenschatz**
1. Cilia Driven Transport Networks in the Brain.

**Timothy G. Buchman**
1. The Networks of the Self: Health, Healthy States and Physiologic Resilience.
2. The Networks of the Self: Critical Illness and Critical Care.

**Edward T. Bullmore**
1. Economical Brain Networks from Micro to Macro Scales.
2. Human Brain Networks in Health and Disease.

**Luca Faes**
1. Information Theory for Network Physiology: Multivariate and Multiscale Methods to Dissect the Information Content of Brain, Cardiovascular and Muscular Networks.

**Alexander Gorbach**
1. A Network Physiology Approach to the Cardiovascular System.

**Plamen Ch. Ivanov**
1. The Emerging Field of Network Physiology: From Complex Dynamics of Individual Systems to Networks of Organ Interactions and the Human Physiolome.

**Klaus Lehnertz**
1. Deriving Functional Brain Networks from Data: A Critical Assessment.
2. Long-term Dynamics of Large-scale Epileptic Brain Networks.

**Kang K L Liu**
1. Emergent Coordination Among Physiologic Systems: New Network Signatures for Physiologic State and Function.

**Hagen Malberg**
1. Contactless Measurement Technologies in Medicine: from Biosignal Processing to Physiological Networks.
2.Automatic Control in Medicine and Fuzzy Logic as An Universal Method for Analyzing Physiological Interactions.

**Dick Moberg**
1. The Mysteries of the Injured Brain: Can they be solved with network physiology?

**J. Randall Moorman**
1. Cardiorespiratory Networking is Altered Early in Subacute Potentially Catastrophic Illness.
2. Entropy Estimation-based Assessment of Physiological Networks.

**Begonya Otal**
1. Current and future applications of BCIs

**Louis M. Pecora**
1. Discovering, Constructing, and Analyzing Synchronous Clusters of Oscillators in A Complex Network Using Symmetries
(Part 1).
2. Discovering, Constructing, and Analyzing Synchronous Clusters of Oscillators in A Complex Network Using Symmetries
(Part 2).

**Thomas Penzel**
1. Signal Recording and Non-linear Signal Processing for Interacting Signals in Sleep Research.
2. ECG, Heart Rate, and Physiological Coupling Analysis to Diagnose Sleep Disorders.

**Arkady S. Pikovsky**
1. Chimeras and Other complex States in Multifrequency Networks.
2. Phase Description of Observed Oscillatory Networks.

**Caterina A. M. La Porta**
1. Pathway Deregulation in Obesity

**Michael G. Rosenblum**
1. Quasiperiodic Partial Synchrony in Oscillatory Networks.
2.Reconstruction of Network Connectivity from Observations.

**Antonio Scala**
1. Network Physiology Approach in Dental Medicine: Applications to Orthodontic Diagnosis and Treatment.

**Ruedi Stoop**
1. A Critical Network is What You Hear.
2. Generic Roads to Neural Network Critical States.

**Sebastiano Stramaglia**
1. Synergetic and Redundant Information Flow Detected by Causal Analysis of Dynamical Networks.

**Béla Suki**
1. Elastic Network Models of Lung Tissue Diseases and Their Treatments.
2. Physiological Networks Perspective on the Origin and Phase Transitions of Life.

**Stefano Zapperi**
1. Pathway Deregulation in Obesity.

# First International Summer Institute on Network Physiology (ISINP)

Lake Como School of Advanced Studies - July 24-29, 2017

## Participants

### ISINP 2017 Participants Group Photo

Front (from left to right): Mandy Hintz , Waning Xiong, Rossella Rizzo, Francesca Bertacchini, Antonio Scala, Giulio Casati, Yanjun Xu

Second line (from left to right): Giulia Forcellini, Stefania Coelli, Lara Durán-Trio, Marianna La Rocca, Martina Valente, Matteo Zanetti, Begonya Otal, Chris Gong, Aparna Basu, Plamen Ivanov, Rudi Stoop, Stéphane Dellisux, Alexander Gorbach, Stefano Boccaletti, Andras Eke, Eberhard Bodenschatz, Klaus Lehnertz, Ronny Bartsch, Yuhan Yu, Shamim Nemati, Alessandro Loppini

Third line (from left to right): Racz Frigyes Samuel, Nicolò Pini, Eero Satuvuori, Luis Fees, Pedro Carpena, Manuel Gomez Extremera, Pedro Bernaola, Fabrizio Lombardi, Javier Rasero Daparte, Luis F. Cirla Perez, Yuri Antonacci, Ruben Fossion, Théophile Caby, Stefano Finazzi, Cagdas Topcu, Thorsten Rings, Guzmán Alba, Michael G. Rosenblum, Arkady S. Pikovsky, Eugen Gheorghiu, Mihaela Gheorghiu, Sebastiano Stramaglia, Timothy G. Buchman, Louis M. Pecora, Dick Molberg, Kang Liu, Karlis Kanders, Michael Müller, Qianli Ma

## List of Participants:

**Luis F. Cirla Perez**, Ph. D. student
Mind Brain and Behavioral Research Center, University of Granada, Spain

**Martina Valente**, MS student
Department of Telecommunications Engineering, University of Trento, Italy

**Lei Yu**, Ph. D. , Associate Professor
Complex Systems Research Center, Shanxi University, China

**Thorsten Rings**, Ph. D. student
Helmholtz-Institute for Radiation and Nuclear Physics and Interdisciplinary Centre for Complex Systems, Bonn University, Germany

**Javier Rasero Daparte**, Ph. D. , Post-doctoral Researcher
BioCruces Health Research Institute, University of Bari, Italy

**Yu-tian Yu**, Ph. D. , Post-doctoral fellow
Institute of Acupuncture and Moxibustion, China Academy of Chinese Medical Sciences, Beijing, China

**Michael Müller**, Ph. D. student
Sleep-Wake-Epilepsy-Center (SWEZ), Department of Neurology and Support Center for Advanced Neuroimaging (SCAN), University Institute for Diagnostic and Interventional Neuroradiology, Inselspital, Bern University Hospital, Switzerland

**Wanting Xiong**, Ph. D. student
School of Systems Science, Beijing Normal University (BNU), China

**Manuel Gomez Extremera**, Ph. D. student
Department of Applied Physics II, University of Malaga, Spain

**Matteo Zanetti**, Ph. D. student
Department of Industrial Engineering, University of Trento, Italy

**Pedro Bernaola-Galvan**, Ph. D. , Professor
Department of Applied Physics II, University of Malaga, Spain

**Pedro Carpena**, Ph. D. , Professor
Department of Applied Physics II, University of Malaga, Spain

**Chunhua Bian**, Ph. D. , Associate Professor
School of Electronic Science and Engineering, Nanjing University, China

**Qianli Ma**, Ph. D. , Associate Professor
Department of Biological Information, Nanjing University of Posts and Telecommunications, China

**Eugen Gheorghiu**, Ph. D. , Professor
Director, International Centre of Biodynamics, Bucharest, Romania

**Mihaela Gheorghiu**, Ph. D. , Professor
International Centre of Biodynamics, Bucharest, Romania

**Chen Chris Gong**, Ph. D. student
Institute for Physics and Astronomy, University of Potsdam, Germany

**Eero Satuvuori**, Ph. D. student
Department of Physics and Astronomy, University of Florence, Italy

**Cagdas Topcu**, Ph. D. student
Medical University of Graz, Austria and Institute for Physics and Astronomy, University of Potsdam, Germany

**Théophile Caby**, Ph. D. student
Mathematics Department, University of Insubria, Como, Italy

**Yanjun Xu**, Ph. D. student
Department of Molecular Developmental Biology, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany

**Alireza Mani**, MD, Ph. D.
Division of Medicine, University College London (UCL), UK

**Giulia Forcellini**, Ph. D. student
Center for Neuroscience and Cognitive Systems, Istituto Italiano di Tecnologia, Rovereto, Italy

**Andras Eke**, MD, Ph. D. , Professor
Department of Physiology, Semmelweis University, Budapest, Hungary

**Racz Frigyes Samuel**, MD, Ph. D. Student
Department of Physiology, Semmelweis University, Budapest, Hungary

**Mandy Hintz**, MD
Epilepsy Center, Department of Neurosurgery, Medical Center, University of Freiburg, Germany

**Yuri Antonacci**, Ph. D. Student
Computer, Control and Management Engineering "Antonio Ruberti", Sapienza University of Rome, Italy

**Marianna La Rocca**, Ph. D.
Inter-University Physics Department "M. Merlin", University of Bari, and National Institute of Nuclear Physics, Bari section, Italy

**Toshihiro Tanizawa**, Ph. D. , Professor
Department of Social Design Engineering, National College of Technology, Kochi College, Japan

**Guzmán Alba**, Ph. D. Student
Laboratory of Human's Psychophysiology and Health, University of Granada, Spain

**Jana Krohova**, Ph. D. Student
Department of Physiology and Biomedical Centre Martin Jessenius Faculty of Medicine, Comenius University, Martin, Slovak Republic

**Stéphane Dellisux**, MD, Ph.D.
Lung function and exercise laboratory, cardiovascular and thoracic hub, Hôpital Nord, Assistance Publique – Hôpitaux de Marseille and Mix Research Unit DS-ACI: Dyscoxia-Overactivity, from cell to integrated physiology, Aix-Marseille Université, Marseille, France

**Aparna Basu**, Ph.D.
Department of Computer Science, South Asian University, New Delhi, India

**Shamim Nemati**, Ph. D. Assistant Professor
School of Medicine and Mathematics and Computer Science Department, Emory University, Atlanta, USA

**Nicolò Pini**, Ph. D Student
Department of Electronics, Politecnico di Milano, Italy

**Tania Jetzabel Contreras Uribe**, Ph. D. Student
Complex System Lab, National Polytechnic Institute (IPN), UPIITA, Mexico City, Mexico

**Cesar Fabian Reyes Manzano**, Ph. D. Student
Complex System Lab, National Polytechnic Institute (IPN), UPIITA, Mexico City, Mexico

**Stefania Coelli**, Ph. D. Student
Department of Electronics, Information and Bioengineering, Politecnico di Milano, Milan, Italy

**Francesca Bertacchini**, Ph. D.
DIMEG Department of Engineering, Mechanics, Energy and Management, University of Calabria, Rende, Italy

**Ruben Fossion**, Ph. D.
Complexity Science Centre (C3) & Nuclear Science Institute, Nationl, Autonomous University of Mexico, Mexico City, Mexico

**Rossella Rizzo**, Ph. D. Student
Department of Physics, University of Calabria, Msilmeri, Italy

**Man Luo**, Master, Master graduate student
Institute of Acupuncture and Moxibustion, China Academy of Chinese Medical Sciences, Beijing, China

**Alessandro Loppini**, Ph. D.
Nonlinear Physics and Mathematical Modeling Laboratory, Campus Bio-Medico University of Rome, Italy

**Karlis Kanders**, Ph. D. Student
Institute of Neuroinformatics, ETH Zurich & University of Zurich, Switzerland

**Lara Durán-Trío**, Ph. D.
Severo Ochoa Centre for Molecular Biology (CBMSO), Autonomous University of Madrid, Spain

**Stefano Finazzi**, Ph.D.
Laboratory of Clinical Epidemiology, Mario Negri Institute for Pharmacological Research. C IRCCS, Ranica (BG), Italy

**Fabrizio Lombardi**, PhD
Keck Laboratory for Network Physiology, Department of Physics, Boston University, Boston, MA, USA

# First International Summer Institute on Network Physiology (ISINP)

Lake Como School of Advanced Studies - July 24-29, 2017

## Application & Deadlines

**Application:**

The Lake Como School on Advances in Complex Systems is open to 60 PhD. students, postdoctoral fellows, research scientists and faculty.The school fee is 400€ (VAT 22% included) and includes all lectures, course material, Wi-Fi connections, lunches, coffee breaks.

**How to apply:**

All applicants have to fill out the application form and to submit a short CV, list of publications, and a motivation letter for their participation in the Summer Institute. (see Application Form)

Applicants working on projects related to Network Physiology are encouraged to submit a two-page abstract summary of their work as PDF (see Application Form) and to present at the poster session during the Summer Institute (see Poster & Announcements).

We encourage potential applicants to submit their documents well in advance of the application deadline.

Application materials will be reviewed and applicants will be notified on a regular basis.

The application materials should be sent to:

Prof. Plamen Ch. Ivanov

Email: lab.network.physiology[AT]gmail.com * * [AT] = @

**Deadlines**

- Application: June 15, 2017
- Notification of acceptance: May 31, 2017
- Registration (only accepted participants): June 15, 2017

# First International Summer Institute on Network Physiology (ISINP)

Lake Como School of Advanced Studies - July 24-29, 2017

## Application Form

To submit an application please fill in the personal information form and send the required submission materials (listed below) as PDFs.

Personal information form (required):

Title

Name

Surname

Department

Institution

Street

Postal code

Town

Country

Phone

Email

**Application materials for students and postdocs**
Required: curriculum vitae; list of publications; motivation letter.
Optional: title and two-page abstract for poster presentation.(See Poster & Announcements)
[pdf, max 2MB]

Scegli il file Nessun file scelto

**Application materials for faculty**
Required: curriculum vitae; list of publications.
Optional: title and two-page abstract for poster presentation.(See Poster & Announcements)
[pdf, max 2MB]

Scegli il file Nessun file scelto

PLEASE NOTE! PLEASE FIRST CLICK ON THE "SEND" BUTTON, THEN GO AHEAD WITH PAYMENT BY PAYPAL. IF YOU DO NOT CLICK ON THE "SEND" BUTTON, THE FORM WILL NOT BE SENT.

☐ By submitting this application form you authorise Fondazione Alessandro Volta to include your personal data on its mailing list for the distribution of information material. In accordance with the Law 196/2003, you may have access to these details at any time and request their modification and cancellation.

Send

.

# First International Summer Institute on Network Physiology (ISINP)

Lake Como School of Advanced Studies - July 24-29, 2017

## Registration Form

**Please note: this registration form is only for accepted applicants!**

**Personal information (required)**

Title

Name

Surname

Department

Institution

Street

Postal code

Town

Country

Phone

Email

☐ By submitting this registration form you authorise Fondazione Alessandro Volta to include your personal data on its mailing list for the distribution of information material. In accordance with the Law 196/2003, you may have access to these details at any time and request their modification and cancellation.

**Payment information (required)**

Registration fees

○ The school fee is 400€ (VAT 22% included) and includes all lectures, course material, Wi-Fi connections, lunches, coffee breaks.

Payment option

○ by credit card online ○ by bank transfer

*For credit card payment click the "pay now" button at the bottom of this page.

*For bank transfer: make it out to Fondazione Alessandro Volta, ref. "ISINP school" drawn on Banca di Credito Cooperativo Alta Brianza – Alzate Brianza, Como, Via Rubini 3, 22100 Como – IBAN: IBAN IT13L 08329 10900 00000 0300088 – BIC: ICRAITRR950

Type of document

○ receipt ○ invoice

Invoice to be sent to:

VAT id/Fiscal code

Indicate both if different: they are mandatory to issue invoices.

PLEASE NOTE! PLEASE FIRST CLICK ON THE "SEND" BUTTON, THEN GO AHEAD WITH PAYMENT BY PAYPAL. IF YOU DO NOT CLICK ON THE "SEND" BUTTON, THE FORM WILL NOT BE SENT.

Send

**ISINP Registration fees**

€ 400 Registration fee

**Your Email Address :**

Pay Now

## Venue & Accommodation

**Venue**
Villa del Grumello
More information can be found at:
http://www.villadelgrumello.it/?q=en

Fondazione Alessandro Volta
Via per Cernobbio 11, 22100 Como, ITALY

**Accommodation**

To book a room via the Organizing Secretariat, please fill out the accommodation form **before June 15th, 2017**. A PDF of the accommodation form can be downloaded from the link below.
Please send the accommodation form to Ms. Mariagiovanna Falasconi at Fondazione Alessandro Volta:

Email: mariagiovanna.falasconi@fondazionealessandrovolta.it

Villa del Grumello has a guest house ("foresteria") with 2-bed or 4-bed rooms with space for 19 participants. The guest house rate is 33.00 euros per night (breakfast not included; a kitchen for self-preparing breakfast is available). Only shared accommodation is possible in the guest house.

There is no 24h-open reception at the guest house.

Check in: Sunday 23 July from 17.00 to 20.00. *
Check out: Saturday 29 July by 10.00. **

* If you arrive late please contact us to organize key pick up.

**The room has to be left and luggage has to be removed from the room by 10am. Luggage can be stored in the Villa until your departure if the school is not finished yet.

Additional rooms for participants have been blocked in 3-star hotels in Como, with rates 70 – 100 euros per night for single or double single rooms, and 112 – 120 euros per night for double rooms (breakfast included). Link to the accommodation form is below.

**Please download PDF of the accommodation form here.**

**DEADLINE FOR HOTEL RESERVATIONS:**

**How to get there**
Click here for further information on how to reach Como.

Villa del Grumello is 20 min on foot from the city center – you can also take a bus, line 6 and line 11.

Download the timetable. Bus stop: "Como Via Regina Piscine Villa Olmo" (it is not indicated in the timetable, but it's just after "Villa Olmo").

From the main Train Station (Como S. Giovanni), the nearest bus stop to catch line 6 and 11 is "Piazzale Rocchetto".

**How to get to Como from Milan Malpensa Airport**

At the ticket office of the *Malpensa Express* train station, located at Terminal 1, underground floor, buy a ticket for the trip MALPENSA-SARONNO-COMO (ca. 10 Euros, one way). Two separate tickets will be issued (Malpensa-Saronno and Saronno-Como), which must be stamped before getting on the train.

For those landing at Terminal 2, a free shuttle-bus service connecting the two Terminals operates 24 hours a day, with departures every 7 minutes during the day, and every 30 minutes at night (from 10.45 p.m. to 5:15 a.m.).

Take a *Malpensa Express* train stopping in SARONNO (ca. 30-minute ride; please note that not all the *Malpensa Express* rides make intermediate stops between the airport and Milan). Get off in SARONNO and take a *Trenord* train to COMO (typically from track #2, ca. 30-minute ride).

There are around 50 daily *Malpensa Express* rides stopping in Saronno.
Information upon this service can be retrieved at http://www.malpensaexpress.it/en/

There are 3 *Trenord* train stations in Como, COMO NORD CAMERLATA, COMO NORD BORGHI, and COMO NORD LAGO. Participants going to any of the hotels located in the city center or heading directly to the Conference Venue, should preferably get off at the last train station, COMO NORD LAGO, Piazza Matteotti.

Information upon *Trenord* can be retrieved in Italian at http://www.trenord.it/it/home.aspx
For the timetable, please consult http://www.trenord.it/it/servizi/motore-orario.aspx

Once arrived at COMO NORD LAGO, a 15-minute walk allows to reach Villa del Grumello.

**How to get to Como from Milan Linate Airport**

Outside the arrivals floor, take either bus 73 (making intermediate stops) or bus X73 (without intermediate stops) heading to SAN BABILA underground station in Milan (ca. 20-minute ride).

In SAN BABILA, take the underground (red line, also called line 1) directed either to BISCEGLIE or to RHO FIERA MILANO. Get off at CADORNA station (4 stops, 8-minute ride). A single ticket for both rides has to be bought in advance inside the air-terminal, at one of the newspapers stands (1.50 Euros).

A map of Milan underground lines can be found at
http://www.nbts.it/milano/mappa_metropolitana_1.htm

Once in CADORNA, exit to the ground level following the arrows labeled "to trains", to enter *Trenord* train station. At the *Trenord* ticket office, buy a ticket to COMO (ca. 5 Euros, one way, 1-hour ride).

There are 3 *Trenord* train stations in Como, COMO NORD CAMERLATA, COMO NORD BORGHI, and COMO NORD LAGO. Participants going to any of the hotels located in the city center or heading directly to the Conference Venue, should preferably get off at the last train station, COMO NORD LAGO, Piazza Matteotti.

Information upon *Trenord* can be retrieved in Italian at http://www.trenord.it/it/home.aspx
For the timetable, please consult http://www.trenord.it/it/servizi/motore-orario.aspx
Once arrived at COMO NORD LAGO, a 15-minute walk allows to reach Villa del Grumello.

**How to get to Como from Bergamo Orio al Serio Airport**

Outside the arrivals floor, take an ORIOSHUTTLE bus heading to MILANO STAZIONE CENTRALE (Milan Central Train Station; ca. 45-minute ride, 5 Euros).

Information about this service can be found at http://www.orioshuttle.com/_eng/
For the timetable, please consult directly http://www.orioshuttle.com/pdf/OS_01_ITA.pdf

Once arrived at MILANO STAZIONE CENTRALE, you can either

**a.**Take a fast train from there to COMO STAZIONE SAN GIOVANNI (Como Central Railway Station), along the Milano-Chiasso-Gotthard line (ca. 35-minute ride, 10 Euros).

To retrieve information upon this service, please consult http://www.trenitalia.com/

**b**.Take the underground (green line, also called line 2) heading to ABBIATEGRASSO or ASSAGO. Get off at

**b.1** CADORNA (5 stops, 10-minute ride). A ticket for this ride can be bought at one of the newspapers stands (1.50 Euros) inside the underground station.

Once in CADORNA, exit to the ground level following the arrows labeled "to trains", to enter *Trenord* train station. At the *Trenord* ticket office, buy a ticket to COMO (ca. 5 Euros, one way, 1-hour ride). There are 3 *Trenord* train stations in Como, COMO NORD CAMERLATA, COMO NORD BORGHI, and COMO NORD LAGO. Participants going to any of the hotels located in the city center or heading directly to the Conference Venue, should preferably get off at the last train station, COMO NORD LAGO, Piazza Matteotti.

Information upon *Trenord* can be retrieved in Italian at http://www.trenord.it/it/home.aspx
For the timetable, please consult http://www.trenord.it/it/servizi/motore-orario.aspx

Once arrived at COMO NORD LAGO, a 15-minute walk allows to reach Villa Olmo, Via Cantoni 1.

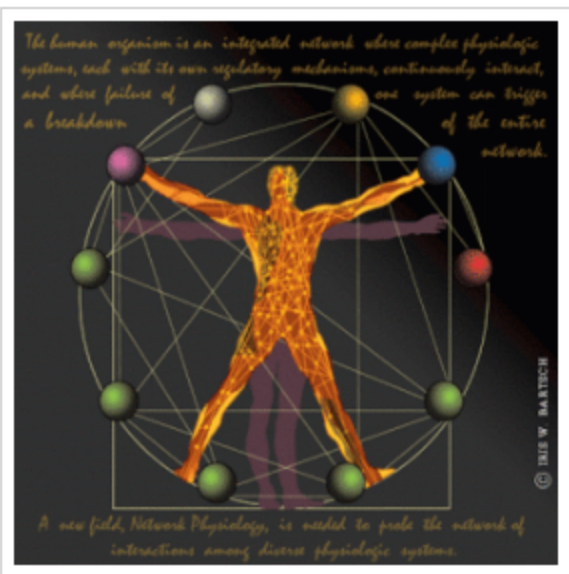
**b.2** PORTA GARIBALDI STATION (2 stops, 4-minute ride). A ticket for this ride can be bought at one of the newspapers stands (1.50 Euros) inside the underground station. Once in PORTA GARIBALDI, exit to the ground level following the arrows labeled "to trains", to enter *Trenitalia* train station. At the *Trenitalia* ticket office, buy a ticket to COMO SAN GIOVANNI (ca. 5 Euros, one way, 1-hour ride).

For the timetable, please consult http://www.trenord.it/it/servizi/motore-orario.aspx
Once arrived at SAN GIOVANNI, a 15-minute walk allows to reach Villa del Grumello.

# First International Summer Institute on Network Physiology (ISINP)

Lake Como School of Advanced Studies - July 24-29, 2017

## Contact Us




For inquiries about the scientific aspects of the International Summer Institute on Network Physiology and applications to attend, please contact:

Prof. Plamen Ch. Ivanov
Email: lab.network.physiology[AT]gmail.com *  * [AT] = @

For inquiries about the venue of the school, travel, accommodation, and registration procedure, please contact Ms.Mariagiovanna Falasconi at Fondazione Alessandro Volta:

FONDAZIONE ALESSANDRO VOLTA
Villa del Grumello
Via Per Cernobbio 11
22100 Como, Italy

Ms. Mariagiovanna Falasconi
Tel. +39 031 579814
Fax +39 031 573395
Email Mariagiovanna.falasconi@fondazionealessandrovolta.it

# First International Summer Institute on Network Physiology (ISINP)

Lake Como School of Advanced Studies - July 24-29, 2017

## Poster & Announcements

**Application Deadline: June 15, 2017**

**ISINP Announcement Poster**
(Click on image to download PDF)

**Recent Focus Issues on Network Physiology:**

1. "*The new field of Network Physiology: redefining health and disease through networks of physiological interactions*" is now open in the journal Physiological Measurement, IOPscience.
2. "*Focus on Network Physiology and Network Medicine*" in the journal New Journal of Physics, IOPscience.

**Poster Session for participants:**

Applicants currently working on projects related to Network Physiology are encouraged to present at the poster session that will be organized during the Summer Institute.

Applicants who plan to present at the poster session should include in their application material (Application Form) also a PDF with title, authors and two-page single space abstract structured in sections on Study Objectives, Methods, results (possibly including 1 or 2 figures), Conclusions, and up to 5 references.

Applicants are invited to submit their work to the Focus Issue "The new field of Network Physiology: redefining health and disease through networks of physiological interactions" which is now open in the journal Physiological Measurement, IOPscience.

**Readings related to Network Physiology as first steps in building a dynamic Atlas of Organ Interactions**


1. *Network physiology reveals relations between network topology and physiologic function.* [ PDF ]
Nature Communications 2012; 3: 702 doi: 10.1038/ ncomms1705.

2. *Network Physiology: how organ systems dynamically interact.* [ Open access ]
PLOS ONE, 2015; 10(11): e0142143

3. *Major component analysis of dynamic networks of physiologic organ interactions.* [ PDF ]
Journal of Physics: Conference Series, 2015; 640, 012013

4. *Plasticity of brain wave network interactions and evolution across physiologic states.* [ Open access ]
Frontiers in Neural Circuits, 2015; 9:62

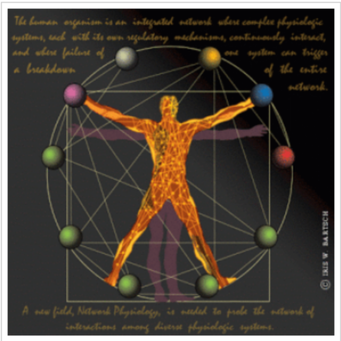
5. *Coexisting forms of coupling and phase-transitions in physiological networks.* [ PDF ]
Communications in Computer and Information Science 2014; 438: 270-287

6. *Focus on the emerging new fields of network physiology and network medicine.* [ PDF ]
New Journal of Physics, 2016; 18:100201.

# First International Summer Institute on Network Physiology (ISINP)

Lake Como School of Advanced Studies - July 24-29, 2017

## School Director



**Plamen Ch. Ivanov**

Professor Ivanov, PhD, DSc, is Director of the Keck Laboratory for Network Physiology at Boston University, Associate Physiologist at the Division of Sleep Medicine, Brigham and Women's Hospital, and Lecturer in Medicine at Harvard Medical School.

He has introduced innovative ways of analyzing and modeling physiologic systems, adapting and developing concepts and methods from modern statistical physics and nonlinear dynamics. He has investigated the complex dynamics and underlying control mechanisms of a range of physiological systems, including studies on cardiac and respiratory dynamics, sleep-stage transitions, circadian rhythms, locomotion and brain dynamics, and has uncovered basic laws of physiologic regulation.

Dr. Ivanov has pioneered the study of dynamical network interactions of physiological organ systems, and has initiated Network Physiology as a new field of research. His current research focuses on developing methods of data analysis and a theoretical framework to understand how physiologic states and functions emerge out of organ network interactions, and how diverse organ systems coordinate and integrate their functions to produce health or disease.

His discoveries have been featured in the media, including New Scientist, Nature Science Update, Nature Medicine: Research Highlights, The Washington Post, Science News, The Boston Globe, Physics World. He has served on the Editorial and Advisory Boards of nine scientific journals, including EPL (Europhysics Letters), EPJ Nonlinear Biomedical Physics, Journal of Biological Physics (JOBP), Frontiers in Fractal Physiology, Physiological Measurement, and has organized, co-chaired and chaired international workshops, symposia and conferences.

For his pioneering applications of statistical physics and nonlinear dynamics to physiology and biomedicine, and for uncovering fundamental scaling and multifractal properties, self-organized criticality, sleep- and circadian-related phase transitions in physiologic dynamics, he was elected Fellow of the American Physical Society in 2010. He is recipient of the Sustained Research Excellence Award of the Biomedical Research Institute at Harvard Medical School, the Georgi Nadjakov Medal of the Bulgarian Academy of Sciences, the Pythagoras (Pitagor) Prize for scientific achievements and the W. M. Keck Foundation Award.