

## **Frontiers of Quantum and Mesoscopic Thermodynamics (FQMT'19)**

**14 July (Sunday) – 20 July (Saturday) 2019, Prague, Czech Republic**

<https://fqmt.fzu.cz/19/>

### **Scope of the Conference**

The main goal of the conference is to contribute to a better understanding of the behavior of quantum systems out of equilibrium. To reach this aim we also need to improve our knowledge of systems in equilibrium and steady state situations. The conference will thus address foundations of quantum physics, quantum many body physics, statistical physics, and thermodynamics relying on the theoretical and experimental methods of condensed matter physics and quantum optics. The systems considered will be mainly on the order of mesoscopic (nanoscale) size, and include those of both natural and artificial origin. Special attention will be given to non-equilibrium quantum systems, physics of quantum information and manifestation of quantum effects in biological systems. Subjects from astrophysics, gravitation or cosmology related to the above scope will also be included.

### **Topics**

- Non-equilibrium quantum phenomena
- Foundations of quantum physics
- Quantum measurement, entanglement and coherence
- Dissipation, dephasing, noise and decoherence
- Many body physics, quantum field theory
- Quantum statistical physics and thermodynamics
- Quantum optics
- Quantum simulations
- Physics of quantum information and computing
- Topological states of quantum matter, quantum phase transitions
- Macroscopic quantum behavior
- Cold atoms and molecules, Bose-Einstein condensates
- Mesoscopic, nano-electromechanical and nano-optical systems
- Biological systems, molecular motors and quantum biology
- Cosmology, gravitation and astrophysics

## History of the Conference

FQMT'19 is the next event of the series of the previous, successful Prague conferences "Frontiers of Quantum and Mesoscopic Thermodynamics". For the details of their programs and the history of the FQMT conferences see the www pages: <https://fqmt.fzu.cz/>. The title of the conference is historical and survives due to tradition. Today its meaning corresponds only partly to the actual topics of the FQMT'19 conference, see below.

The contributions from the previous conferences are published in Physica E, vol. 29 (1-2), 2005, Physica E, vol. 42 (3), 2010, Physica Scripta vol. T151, 2012, Physica Scripta vol. T165, 2015, and Fortschritte der Physik (Progress of Physics), vol. 65, 2017.

## Multidisciplinary Character of the Conference

The aim of FQMT'19 is to create a bridge between the fields of non-equilibrium statistical physics, quantum many body physics, foundations of quantum physics, quantum thermodynamics, quantum optics, physics of quantum information, astrophysics, condensed matter physics, physics of mesoscopic systems, chemical physics and biophysics.

Following the tradition of the FQMT conferences, FQMT'19 will again bring together a unique combination of both young and experienced scientists across a disciplinary spectrum covering the above mentioned topics. The interdisciplinary character of the conference will be supported by the choice of key speakers who, apart from their specializations, are not only able to report specific results within their fields, but are also able to discuss the state of the art of their fields from the standpoint of a broader perspective of overlap with other fields. It is an objective to gather important scientists from overlapping branches of physics who can mutually benefit from the exchange of different views and ideas, experiences from studies of many different systems and various theoretical and experimental approaches to the study of current problems in physics. It is intended that this arrangement of the scientific program of the conference will again significantly contribute to the formulation of challenging questions and problems, as well as their related answers that are nowadays essential to improve the understanding of the foundations of quantum physics, many body physics, quantum statistical physics of systems far from equilibrium, the physics of nanoscale and biological systems, and further, will motivate new collaboration and intensive discussions between experts from differing fields of physics, chemistry, and biology.

## Musical, Art and Social Programs

In keeping with the multidisciplinary character of the scientific program, the cultural richness of the city of Prague and the tradition of the previous FQMT conferences, the FQMT'19 program will again feature concerts of classical and jazz music performed by world-class musicians, held at outstanding venues of the city. The scientific, the fine arts, and the musical programs are intended as a complement to one another, where scientists, historians of the arts and musicians are encouraged to mingle and share their knowledge and experience. An encompassing social program is planned which will include tours and a number of very special events unavailable to the general tourist.

## Scientific Committee

**Chair:** Václav Špička (*Institute of Physics, Czech Academy of Sciences, Prague*)

**Co-Chair:** Theo Nieuwenhuizen (*University of Amsterdam*)

Raymond Dean Astumian (*University of Maine, Orono*)

Roger Balian (*IPhT, Saclay*)

Gordon Baym (*University of Illinois at Urbana - Champaign*)

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Ofer Biham (*Hebrew University, Jerusalem*)

Rainer Blatt (*Innsbruck University*)

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Luiz Davidovich (*Universidade Federal do Rio de Janeiro*)

Daniel Esteve (*CEA-Saclay*)

Peter Hänggi (*University of Augsburg*)

Dudley Herschbach (*Harvard University*)

Gregg Jaeger (*Boston University*)

Christopher Jarzynski (*University of Maryland, College Park*)

Wolfgang Ketterle (*Massachusetts Institute of Technology, Cambridge*)

Andrei Khrennikov (*Linnaeus University, Växjö*)

Norbert Kroo (*Hungarian Academy of Sciences, Budapest*)

Pavel Kroupa (*University of Bonn, Charles University, Prague*)

Anthony J. Leggett (*University of Illinois at Urbana - Champaign*)

Igor Lerner (*University of Birmingham*)

Heiner Linke (*Lund University*)

Yigal Meir (*Ben Gurion University, Beer Sheva*)

Franco Nori (*RIKEN, Wako-shi, and University of Michigan, Ann Arbor*)

Henri Orland (*CEA-Saclay*)

Giorgio Parisi (*Università di Roma I. La sapienza*)

William Daniel Phillips (*NIST and University of Maryland, Gaithersburg*)

Jean Michel Raimond (*École Normale Supérieure, Paris*)

Christophe Salomon (*Laboratoire Kastler Brossel, Paris*)

Marlan Scully (*Texas A&M University, Baylor University and Princeton University*)

Georgy Shlyapnikov (*Université Paris Sud*)

Wolfgang Schleich (*University of Ulm*)

Ady Stern (*Weizmann Institute, Rehovot*)

Jan van Ruitenbeek (*Leiden University, Kamerlingh Onnes Laboratory*)

Anton Zeilinger (*University of Vienna*)

Peter Zoller (*Institute for Quantum Optics and Quantum Information, Innsbruck*)

## The conference is supported by

- Institute of Physics, the Czech Academy of Sciences
- Institute for Theoretical Physics, University of Amsterdam, Netherlands
- Department of Physics, Texas A&M University, USA
- College of Engineering and Science, University of Detroit Mercy, USA
- Institut de Physique Théorique, CEA/CNRS Saclay, France

## The conference is organized by

- Institute of Physics, the Czech Academy of Sciences

## Organizing Committee

**Conference chair:** Václav Špička (*Institute of Physics, Czech Academy of Sciences, Prague*)

**Members:**

Jiří Bok (*Charles University, Prague*)

Howard Brubaker (*Detroit*)

Pavla Bušová (*Prague*)

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Jarmila Šidáková (*Prague*)

Yuval Waldman (*Music Bridge International, New York*)