

# QUANTUM CHAOS & CONTROL

XVIII Giambiagi Winter School



**July 25-29 2016, Buenos Aires, Argentina**

Quantum mechanics, initially developed to explain the behavior of matter and its interactions with light on the scale of atoms and subatomic particles, turned out to be the most successful physical theory of the 20th century and the foundation of an ongoing technological revolution.

Due to the Heisenberg uncertainty principle, in quantum mechanics the notion of trajectory is lost. As a consequence, the classical concept of chaos becomes meaningless as well. The quantum manifestations of chaos and its semiclassical limit, a subject known as “quantum chaos”, have been explored for 40 years. This research area has received increasing attention because of its relation to control, relaxation and thermalization processes in many-body systems.

The control of microscopic systems in order to obtain a desired final state or a certain value of a physical observable represents a major present goal in the field of quantum technologies. This has led to the development of sophisticated techniques, known generically as “quantum control”. To assess the efficiency of any quantum-control protocol, especially in a many-body setting, the challenge posed by chaotic dynamics cannot be overlooked.

The main purpose of this School is to bring together these two fundamental aspects of the quantum world by covering the following topics:

- Quantum chaos: theory and applications.
- The theory of quantum control in simple and quantum many body systems.
- Influences of chaos in control techniques and what can be done about it.

## Invited speakers and courses

### Andreas Buchleitner

Albert-Ludwigs-Universität Freiburg (Germany)

*Quantum control: determinism, chaos, disorder*

### Adolfo del Campo (to be confirmed)

University of Massachusetts Boston (United States)

*Shortcut to Adiabaticity and Quantum Speed Limits*

### Rodolfo Jalabert

Université de Strasbourg IPCMS (France)

*Introduction to semiclassical mechanics*

### Horacio Pastawski

Universidad Nacional de Córdoba (Argentina)

*Irreversibility and chaos in quantum mechanics*

### Gregor Tanner

The University of Nottingham (United Kingdom)

*Wave Chaos in Engineering Applications*

### Fabricio Toscano

Universidade Federal do Rio de Janeiro (Brazil)

*Quantum metrology and quantum control*

### Juan Diego Urbina

Universität Regensburg (Germany)

*Many body semiclassics*

## Organizing Committee

Leonardo Ermann

Ignacio García-Mata

Pablo Tamborenea

Diego Wisniacki

María Cambón (secretary)

## Contact information

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(Please indicate: "2016 Giambiagi Winter School")

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Partial financial support available for a limited number of students from Latin America  
**(Deadline: May 7th)**

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