



**ICTP** | International Centre for Theoretical Physics  
**SAIFR** | South American Institute for Fundamental Research

**Campus of IFT-UNESP - São Paulo, Brazil**

**May 20 – 24, 2024**

**MINICOURSE ON  
 PERTURBATIVE AND  
 NONPERTURBATIVE  
 TREATMENT OF QUANTUM  
 GRAVITY PROBLEMS**



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The event is intended as a discussion of specific problems of quantum gravity, with the focus on non-traditional, i.e. qualitatively new, aspects and non-perturbative approaches. The general goal is to explain (or at least better understand) the main contradiction of quantum gravity, which is that the theory to be renormalizable always has higher derivatives, and therefore contains massive higher-derivative ghosts. This leads to classical and quantum instabilities and, in the quantum theory, the removal of ghosts from the spectrum violates the unitarity of the S-matrix. No known approaches to quantum gravity resolve the problem of ghosts in a satisfactory way, which we see as an indication that qualitatively new ideas need to be implemented.

Along with the planned discussions of the aforementioned issues, we will offer three introductory courses on quantum gravity. The mini-course of Prof. Asorey will review quantum gravity from a wide perspective, covering many different subjects. The mini-course by Prof. Menezes will provide an introduction to the basic notions and models of theories with higher derivatives. Finally, the mini-course of Prof. Shapiro will discuss the pertinent issue of decoupling theorems in gravity, which is relevant for determining in which theories of gravity we may expect a universal IR limit, i.e., quantum GR.

The necessary preliminary preparation of participants in this event includes standard courses of general relativity and quantum field theory.

There is no registration fee and limited funds are available for travel and local expenses.

**Application deadline: March 31, 2024**

**Online application and more information:  
[www.ictp-saifr.org/mqgp2024](http://www.ictp-saifr.org/mqgp2024)**



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