



From
18
MAR.
2024
to
26
APR.
2024

08h30
-
21h30

2024-PC1 QUANTUM AND CLASSICAL FIELDS INTERACTING WITH GEOMETRY

Quantum and classical fields interacting with geometry, Paris

IHP
11, Rue Pierre et Marie Curie
75005 Paris

INSCRIPTION

Thematic 6-weeks programme at Institut Henri Poincaré, Paris.

Quantum and classical fields interacting with geometry

March 18th to April 26th, 2024 - IHP, Paris

Presentation of the programme:

URL of the page: <https://www.ihp.fr/en/events/quantum-and-classical-fields-interacting-geometry-paris>

In light of the progress in cosmological observations, in gravitational waves detection and in particle physics, there are exciting perspectives for discoveries at the interface between classical and quantum theories. To make the most of this variety of new data, it becomes increasingly important to understand and model how classical and quantum fields propagate and influence the spacetime geometry, and how quantum phenomena manifest themselves on the large scale.

This imperative raises difficult mathematical questions which require a refined understanding of asymptotic structures, field propagation and spacetime dynamics, and of the relationships of quantum degrees of freedom with geometry. From the mathematical point of view it is now a particularly exciting time to address these interconnected problems because of the broad advances in partial differential equations and in field quantization: the former has resulted in a comprehensive array of methods to describe black hole physics and scattering phenomena on curved spacetimes, whereas the latter has provided crucial clarity into problematic concepts and formalisms, paving also new paths towards capturing quantum effects induced by gravity.

The main objective of the IHP programme will be to take these developments to the next level and to create an environment for an unprecedented exchange of ideas between expert mathematicians and physicists. The focus will be on topics among the following, both from the mathematical and physical perspective:

- Quantum Field Theory on curved spacetimes
- Semi-classical and effective theories of gravity
- Spectral action principles for gravity and beyond
- Asymptotic analysis and scattering on curved spacetimes
- Geometry of null surfaces and the black hole entropy problem

Preliminary list of speakers:

- Lars Andersson (MPI, Potsdam/Golm)
- Spyros Alexakis (University of Toronto)
- Abhay Ashtekar (Penn State)
- Lydia Bieri (University of Michigan)
- Christian Bär (Universität Potsdam)
- Vitor Cardoso (University of Copenhagen)
- Piotr Chruściel (Universität Wien)
- Geoffrey Compère (Université Libre de Bruxelles)
- Nguyen Viet Dang (Sorbonne Université)
- Jan Dereziński (University of Warsaw)
- Gary Gibbons (University of Cambridge)
- Elena Giorgi (Princeton University) *to be confirmed
- Christian Gérard (Université Paris-Saclay)
- Éric Gourgoulhon (Observatoire de Paris)
- Colin Guillarmou (Université Paris-Saclay)
- Peter Hintz (ETH Zürich)
- Stefan Hollands (Universität Leipzig)
- Gerard 't Hooft (Utrecht University)
- Cécile Huneau (Ecole Polytechnique)
- Roberto Longo (University of Rome Tor Vergata)
- Viatcheslav Mukhanov (LMU München)
- Harvey Reall (University of Cambridge)
- Leonardo Senatore (ETH Zürich)
- Andrew Strominger (Harvard University)
- Jérémie Szeftel (Sorbonne Université)
- Robert Wald (University of Chicago)
- Edward Witten (IAS Princeton) *to be confirmed
- Jared Wunsch (Northwestern University)

Scientific organising committee:

- Dietrich Häfner (Université Grenoble Alpes)
- Frédéric Hélein (Université de Paris)
- Andrea Puhm (École Polytechnique)
- András Vasy (Stanford University)
- Bernard Whiting (University of Florida)
- Elizabeth Winstanley (University of Sheffield)
- Michał Wrochna (Cergy Paris Université)



INSTITUT HENRI POINCARÉ

Sorbonne Université / CNRS
11 rue Pierre et Marie Curie
75231 Paris Cedex 05

TIMETABLE

The institute:

- Monday to Friday from 8:30am to 6pm,
- closed on public holidays.

The museum - Maison Poincaré :

- Monday, Tuesday, Thursday and Friday from 9:30am to 5:30pm,
- Saturday from 10am to 6pm,
- closed on Wednesday and Sunday.