



Du  
**18**  
MARS.  
2024  
au  
**26**  
AVR.  
2024

08h30  
-  
21h30

## **2024-PC1 QUANTUM AND CLASSICAL FIELDS INTERACTING WITH GEOMETRY**

### **Quantum and classical fields interacting with geometry, Paris**

Institut Henri Poincaré  
11, Rue Pierre et Marie Curie  
75005 Paris

INSCRIPTION

**Thematic 6-weeks programme at Institut Henri Poincaré, Paris, March 18th to April 26th, 2024.**

Program talks are in the new IHP building, bâtiment Perrin. Conference talks are in the old IHP building, bâtiment Borel.

*Please also register for the workshop if you wish to attend.* It takes place in the week April 8th to 12th, 2024. The link for the registration is here: [Curved spacetimes, field theory and beyond.](#)

The schedule can be found [here](#).

**Beware:** It was reported to us that scammers are sending to participants fraudulent e-mails about accomodation/fees. Please be particularly cautious about e-mails not coming from the organizers nor from an @ihp.fr address.

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Credit: ESO/M. Kornmesser

### **Presentation of the programme:**

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.

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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

Mini-lectures :

- Nguyen Viet Dang (Sorbonne Université) · Constructive Quantum Field Theory on manifolds
- Éricourgoulhon (Observatoire de Paris) · Geometry of Killing horizons and applications to black hole physics
- Peter Hintz (ETH Zürich) · Linear waves and spectral theory
- Stefan Hollands (Universität Leipzig) · Quantum Field Theory on black hole spacetimes
- Prahar Mitra (University of Amsterdam) · A primer on celestial holography

The list of program speakers includes :

- Lars Andersson (BIMSA, Beijing)
- Spyros Alexakis (University of Toronto)
- Bernardo Araneda (Albert Einstein Institute, Potsdam)
- Abhay Ashtekar (Penn State)
- Rudrajit Banerjee (Okinawa Institute of Science and Technology)
- Dean Baskin (Texas A&M)
- Lydia Bieri (University of Michigan)
- Vitor Cardoso (University of Copenhagen) \*cancelled
- Marc Casals (Universität Leipzig)
- Sangmin Choi (University of Amsterdam)
- Piotr Chruściel (Universität Wien)
- Geoffrey Compère (Université Libre de Bruxelles)
- Claudio Dappiaggi (University of Pavia)
- Nguyen Viet Dang (Sorbonne Université)
- Jan Dereziński (University of Warsaw)
- Christopher Fewster (University of York)
- Christian Gérard (Université Paris-Saclay)
- Éricourgoulhon (Observatoire de Paris)
- Colin Guillarmou (Université Paris-Saclay)
- Peter Hintz (ETH Zürich)
- Stefan Hollands (Universität Leipzig)
- Cécile Huneau (Ecole Polytechnique)
- Vojkan Jaksic (McGill University)
- Igor Khavkine (Czech Academy of Sciences, Prague)
- Sergiu Klainerman (Princeton University)
- Christiane Klein (Université Grenoble Alpes)
- Eleni Kontou (King's College London)
- Albert Law (Stanford University)
- Hans Lindblad (Johns Hopkins University)
- Arthur Lipstein (Durham University)
- Roberto Longo (University of Rome Tor Vergata)
- Lionel Mason (University of Oxford)
- Pascal Millet (Ecole Polytechnique)
- Prahar Mitra (University of Amsterdam)
- Viatcheslav Mukhanov (LMU München)
- Nicola Pinamonti (University of Genoa)
- Harvey Reall (University of Cambridge)
- Kasia Rejzner (University of York)
- Romain Ruzziconi (University of Oxford)
- Pierre Schapira (Sorbonne Université)
- Michele Schiavina (University of Pavia)
- Jean-Marc Schlenker (Université du Luxembourg)
- Leonardo Senatore (ETH Zürich)
- Ali Seraj (Queen Mary University of London)
- Alexander Strohmaier (Universität Hannover)
- Grigalius Taujanskas (University of Cambridge)
- Lucas Tavares Cardoso (Federal University of Santa Maria)
- Rainer Verch (Universität Leipzig)
- Robert Wald (University of Chicago)
- Jared Wunsch (Northwestern University)

Scientific organizing committee:

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



### **INSTITUT HENRI POINCARÉ - UAR839**

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11 rue Pierre et Marie Curie  
75231 Paris Cedex 05

### **HORAIRES**

L'institut :

- lundi au vendredi de 8h30 à 18h,
- fermé les jours fériés.

Le musée - Maison Poincaré :

- lundi, mardi, jeudi et vendredi de 9h30 à 17h30,
- samedi de 10h à 18h,
- fermé le mercredi et le dimanche.

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