

Institut de Physique Théorique  
*Theoretical physics courses*



## Aspects of black hole perturbation theory

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*Monday, 17th of June 2024, at 14:15. Fridays: 21, 28 of June & 5, 12 of July, at 10:00.  
In person at IPhT and online.*

The direct detection of gravitational waves from merging binary systems notoriously marked an important milestone in physics. Much of the success of gravitational-wave astronomy relies on perturbation theory. Perturbative approaches are essential ingredients in the study of gravitational-wave sources in the strong-field regime, such as the ringdown after the merger of a binary system, tidally perturbed compact objects, and extreme mass ratio inspirals.

The course will review selected topics in the context of black hole perturbation theory. The lectures will provide a pedagogical introduction to the main concepts and ideas, dating back to the original works by Regge and Wheeler in the 1950s, while covering also some of the more recent developments and results in the literature.

Aspects to be discussed include:

1. Introduction to black hole perturbation theory;
2. Black hole ringdown and quasinormal modes;
3. Effective field theory approach to black hole dynamics;
4. Tidal deformability and response of black holes and compact objects;
5. Extreme mass ratio inspirals and self-force.

To receive the latest news on this course and the video-conference links, please subscribe to its newsletter, as explained at the website [courses.ipht.fr](https://courses.ipht.fr). An open, non-interactive livestream will also be available at [youtube.com/ipht-tv](https://youtube.com/ipht-tv).