	May 31 (Wed)	June 1 (Thu)	June 2 (Fri)
09:00-09:45		Herdeiro	Cano
9:45-10:15	*coffee/registration*	*coffee*	*coffee*
10:15-11:00	Blanchet	Visser	Konoplya
11:00-11:45	Gourgoulhon	Yazadjiev	Jaramillo
12:00-14:00	*lunch*	*lunch*	*lunch*
14:00-14:45	Horvathy	Häfner	Damour
14:45-15:30	Petropoulos	Sarkar	Doneva
15:30-16:00	*coffee*	*coffee*	*coffee*
16:00-16:45	Mason	Taunjanskas	Radu
16:45-17:30	Figueras	Geiller	Barnich
17:30-18:15	Le Floch	Gervalle Potaux Helpin/Goncharov	

TALKS:

Roman Konoplya: First few overtones probe the event horizon geometry

Abstract: It is broadly believed that quasinormal modes (QNMs) cannot tell the black-hole near-horizon geometry, because usually the low-lying modes are determined by the scattering of perturbations around the peak of the effective potential. Using the general parametrization of the black-hole spacetimes respecting the generic post-Newtonian asymptotic, we will show that tiny modifications of the Schwarzschild/Kerr geometry in a small region near the event horizon lead to almost the same Schwarzschild/Kerr fundamental mode, but totally different first few overtones. Having in mind that the first several overtones affect the quasinormal (QN) ringing at its early and intermediate stage [M. Giesler, M. Isi, M. Scheel, and S. Teukolsky, Phys. Rev. X 9, 041060 (2019)], we argue that the near-horizon geometry could in principle be studied via the first few overtones of the QN spectrum, which is important because corrections to the Einstein theory must modify precisely the near-horizon geometry, keeping the known weak field regime. We discuss the connection of this observation with the so called "overtones' instability" recently studied in [J. Jaramillo et. al. Phys. Rev. Lett. 128, 211102 (2022)].

Glen Barnich : Coadjoint representation and geometric action for the BMS4 group

Pablo Cano: The quasinormal modes of higher-derivative Kerr black holes

Luc Blanchet: Gravitational waves from compact binaries beyond the Einstein quadrupole formula

Lionel Mason : Gravity from holomorphic discs and celestial symmetries in split signature

Pau Figueras: Modelling self-consistently beyond general relativity

Abstract: In this talk I will discuss some recent progress in modelling self-consistently alternative theories of gravity involving higher derivative corrections. In the first part, I will discuss the modifications of the standard gauges used in numerical relativity, focusing on the most general scalar tensor theory of gravity up to four derivatives as an example. In the second part, I will discuss higher derivative theories of gravity with higher order equations of motion and how to extract their physical observables.

Greg Taujanskas: Conformal scattering of Maxwell potentials on curved spacetimes

Abstract: The conformal approach to scattering is a combination of the ideas of Penrose's conformal compactification, the classical scattering theory of Lax and Phillips, and Friedlander's work on radiation fields, all developed in the 1960s. Recently there has been a resurgence of interest in the development of precise scattering theories, in particular on curved spacetimes, due to their importance for asymptotics, stability of spacetimes, and potential applications to quantum gravity. In this talk I will review the general setup of these ideas and show how to construct a scattering theory for Maxwell potentials on a non-trivial class of curved spacetimes, called Corvino--Schoen--Chrusciel--Delay spacetimes, where the combination of spacetime curvature and gauge freedom in the Maxwell potential have implications for the regularity of the initial and scattering data. This is based on joint work with J.-P. Nicolas (Brest).

Deb Sarkar: The fate of black hole horizons in semiclassical gravity

Eugen Radu: Asymptotically flat scalar hairy black holes and solitons

Eric Gourgoulhon : Computer algebra on manifolds with applications to gravity

Carlos Herdeiro: On the fate of the LR instability

Stoytcho Yazadjiev: Spontaneous scalarization of Gauss-Bonnet black holes - stationary solutions and dynamics

Jose Luis Jaramillo: Pseudospectrum and black hole QNM instability: ultraviolet and infrared universality conjectures

Marios Petropoulos : Carroll, Cotton and Ehlers

Marc Geiller: Electromagnetic news and asymptotic symmetries in 3d Einstein-Maxwell

Thibault Damour (IHES): Black Hole Binary Dynamics from Classical and Quantum Gravitational Scattering

Abstract: Gravitational wave signals from coalescing binary black holes are detected, and analyzed, by using large banks of template waveforms. The construction of these templates makes an essential use of the analytical knowledge of the motion and radiation of gravitationally interacting binary systems. A new angle of attack on gravitational dynamics consists of considering (classical or quantum) scattering states. Modern amplitude techniques have recently given interesting novel results. These results are reaching a level where subtle conceptual issues arise (quantum-classical transition, radiative effects versus conservative dynamics, massless limit,...).

Peter Horvathy : 50 ans de symétrie de Carroll et d'Effet Mémoire

Abstract: Particles at rest before the passing of a burst of gravitational wave move, after the wave have left, uniformly along diverging geodesics. As recognized by Souriau 50 years ago, the motion is particularly simple in Baldwin-Jeffery-Rosen (BJR) coordinates using the conserved quantities associated with the 5-parameter isometry group more recently identified as Lèvy-Leblond's ``Carroll'' group with broken rotations. Description in terms of global Brinkmann coordinates requires solving a Sturm-Liouville equation. The theory is illustrated by geodesic motion in a circularly polarized approximate sandwich wave with Gaussian envelope.

Dietrich Häfner: The Unruh state for massless fermions on Kerr spacetime and its Hadamard property

Abstract : We give a rigorous definition of the Unruh state in the setting of massless Dirac fields on slowly rotating Kerr spacetimes. This state is a natural state on a spacetime describing an eternal rotating black hole. We will also explain how it appears as a final state in the context of the collapse of a rotating star (Hawking effect). We will show that in the union of exterior and interior region the Unruh state is pure and Hadamard. One of the main ingredients of the proof is the scattering theory for classical Dirac fields. The talk is based on joint work with C. Gérard and M. Wrochna (Unruh state) as well as J.-P. Nicolas (classical scattering theory).

Daniela Doneva: Smoking guns on beyond GR physics and gravitational phase transitions

Abstract: Gravitational waves are among the ultimate tools to test fundamental physics and promise to answer the long-waiting question about the nature of gravity in the regime of strong fields. The degeneracies between different effects are a serious obstacle, though, to fulfilling

this goal since modified gravity often leads to smaller cumulative changes. In the present talk we will focus on a few examples of interesting new effects we can observe in the gravitational wave spectrum that differ qualitatively from the standard picture in general relativity. This includes gravitational phase transition of neutron stars, jumps in the gravitational wave emission from merging black holes, and inverse chirp signal of extreme mass-ratio inspirals. Such effects are valuable because they are a smoking gun of beyond-GR physics that can be easily traced in observations.

Philippe LeFloch (Sorbonne University and CNRS): Parametrization and localization of Einstein's initial and asymptotic data sets

Abstract: I will present advances on Einstein's constraint equations arising in two problems. First, in collaboration with Bruno Le Floch (LPTHE, Sorbonne) and The-Cang Nguyen (Paris), I have introduced and studied the Localized Seed-to-Solution Method. This method allows us to parametrize a large class of asymptotically Euclidian initial data sets and control solutions asymptotically at the (super-)harmonic rate of decay. Our results extend the scope of the variational method introduced by Carlotto, Corvino, Chrusciel, Delay, and Schoen. In the course of this analysis, we discovered the notion of asymptotic modulators. Second, in collaboration with Bruno Le Floch (LPTHE, Sorbonne) and Gabriele Veneziano (CERN, Geneva), I have introduced and studied an asymptotic version of the Einstein constraints near singularities of quiescent type. This led to a classification of junction laws relevant for describing bouncing spacetimes. Moreover, we applied this classification to the colliding gravitational wave problem for plane-symmetric spacetimes containing singularity hypersurfaces.

Yohan Potaux (Tours): Hybrid quantum state in 2d dilaton gravity

Abstract: We consider a 2-dimensional model of semi-classical gravity (RST model) where quantum conformal matter propagates on a classical background metric. Our aim is to gain some insight on the problem of information loss in black holes. In this model quantum particles can be in various quantum states (namely Hartle-Hawking or Boulware) and we study situations where the spacetime contains particles of both states, which we call a hybrid state. After briefly introducing the model, we present a specific solution and discuss its relevance with respect to the black hole information paradox.

Manus Visser: Partition function for a volume of space

In their seminal 1977 paper, Gibbons and Hawking applied concepts of quantum statistical mechanics to ensembles containing black holes, finding that a semiclassical saddle point approximation to the partition function recovers the laws of black hole thermodynamics. We will generalise the Gibbons-Hawking method by defining a partition function of a ball of space at fixed proper volume. In the zero-loop approximation the result is the exponential of the Bekenstein-Hawking entropy of the boundary of the ball, indicating the holographic nature of nonperturbative quantum gravity in generic finite volumes of space. Based on the recent work 2212.10607 with Ted Jacobson.

Romain Gervalle (Tours): Electroweak monopoles and their black hole counterparts

Abstract: In this talk, we explore the magnetic monopoles in the electroweak theory and their properties. We analyze the stability of the spherically symmetric monopoles with respect to generic perturbations. The simplest spherical monopole is the well-known Dirac monopole which describes a pointlike magnetic charge. We found it to be stable for the smallest allowed value of the magnetic charge but unstable for higher values. For the second smallest value, the Dirac monopole is unstable only with respect to spherically symmetric perturbations. The corresponding remnant of the decay could be the non-Abelian monopole of Cho and Maison which has spherical symmetry and that we found to be stable. Then, we consider axially symmetric generalizations of the Cho-Maison monopole which may be viewed as stable remnants for higher values of the magnetic charge. We discuss their inner structure and present some properties of their gravitating counterparts: magnetic black holes with non-Abelian hairs.

Thomas Helpin / Yegor Goncharov (Tours): On trace decomposition of tensors via the Brauer algebra

Abstract: We revisit the problem of decomposing a tensor into irreducible components with respect to the action of the orthogonal group. Our aim is to construct the associated traceless, doubly traceless, etc., projectors in a closed form. For that purpose we invoke the representation theory of the Brauer algebra. The problem of constructing the traceless projector is solved in arXiv:2212.14496. For multi-traceless projectors we discuss an inductive procedure, which starts at a traceless projector. To motivate the construction in question, we mention its application to the trace decomposition of the Riemann tensor within the two gravitation-theoretical frameworks: Riemannian manifolds and metric affine gravity.