Journée scientifique de l'IMB

3 juin 2024, amphi Bernard

10h00–10h45 : Rémi COULON — *First person exploration of Thurston's geometries*

Résumé : *Thurston's conjecture (proved by Perelman) states that any reasonable three-dimensional space can be decomposed into elementary "building blocks" each of which is modeled onto a specific geometry. There are eight such models. Some of them are familiar, like the Euclidean space or the hyperbolic space, others are wilder like Nil or Sol. To gain more insight on this topic, we develop a web app that simulates in real-time what an inhabitant would see in each of these geometries. In this talk we will explain how this software was built and exploit it to illustrate some fun features of the Thurston geometries. This is a joint work with Elisabetta A. Matsumoto, Henry Segerman, and Steve Trettel.*

11h00–11h45 : Bernard RAFFAELLI — *The black hole 'photon shell'*

Résumé : *In General Relativity, black holes are specific space-time manifold geometries, solutions of Einstein's equations. A feature of black holes, which is expected to be observable in the near future, is the 'photon shell'. The 'photon shell' is a region that contains the unstable bound orbits of massless particles around the black hole, resulting in the 'photon rings' when seen by a distant observer. In this talk, after introducing the main framework, the 'photon shell' will be considered as a subset of the (co)-tangent bundle of the space-time manifold, rather than as a subset of the space-time manifold itself. In this context, I will discuss some recent results related to the dynamics of massless particles and probe-scalar fields in the 'near-photon shell' limit, and I will present a conjecture about a Weyl's law for the black hole quasinormal modes in which the 'photon shell' should play a fundamental role.*

12h00–14h00 : Buffet offert par l'IMB en « Salle du Conseil » de l'UFR Sciences & Techniques

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14h00–14h45 : Maxime FAIRON — *Compatible Poisson structures on multiplicative quiver varieties*

Résumé : *Any multiplicative quiver variety is endowed with a Poisson structure constructed by M. Van den Bergh through reduction from a Hamiltonian quasi-Poisson structure. The smooth locus of this variety carries a corresponding symplectic form defined by D. Yamakama through quasi-Hamiltonian reduction. In this talk, I want to explain how to include this Poisson structure as part of a larger pencil of compatible Poisson structures on the multiplicative quiver variety, and that the corresponding 2-forms can be given explicitly. The pencil is defined by reduction from a pencil of (non-degenerate) Hamiltonian quasi-Poisson structures, whose construction can be adapted to various frameworks, e.g. in relation to character varieties. To give some context for this result, I will outline how it is related to the spin Ruijsenaars-Schneider integrable system. The talk is partly based on arXiv :2310.18751. Bla*

15h00–15h45 : Giulio BELLETTI — *Torsion in skein modules of 3-manifolds*

Résumé : *The skein module of a 3-manifold is a rich algebraic object whose elements are knots and links ; it has many fascinating connections to representation theory, mathematical physics and the Jones polynomial. In this talk I will introduce this concept without assuming anything beyond some basic topology, discuss the kind of questions that arise when studying these objects, and present some recent work, joint with R. Detcherry, regarding torsion in skein modules and incompressible surfaces.*

Pause café

16h15–17h00 : Pierre-Yves LOUIS — *Urn models : interaction and synchronization*

Résumé : *Urn models have found several applications, from adaptive design in medical treatments to random networks. Their dynamical evolution is based on reinforced stochastic processes. In the talk we review some of the most popular urn models, in particular Polya's and Friedman's urns, from the perspective of associated stochastic processes and present some recent results about interaction and synchronization. This talk is based on joint works with Crimaldi, Dai Pra, Minelli and Mirebrahimi.*