Séminaire : Problèmes spectraux en physique mathématique

Les séminaires ont lieu à l'**Institut Henri Poincaré**, 11 rue Pierre et Marie Curie, Paris.

Programme du lundi 28 mai 2018, en **salle 314** (3e étage)

— 11h15 - 12h15 : **Alexander Watson** (Duke)
Wave-packet dynamics in locally periodic media.

We study the dynamics of wave-packet solutions of Schrödinger's equation and Maxwell's equations in media with a local periodic structure which varies adiabatically (over many periods of the periodic lattice) across the medium. We focus in particular on the case where symmetries of the periodic structure lead to degeneracies in the Bloch band dispersion surface. We derive systematically and rigorously the 'anomalous velocity' of wave-packets due to the Berry curvature of the Bloch band, and the dynamics of a wave-packet incident on a Bloch band degeneracy in one spatial dimension.
Joint work with Michael Weinstein and Jianfeng Lu.

— 14h - 15h : **Ivan Bardet** (IHES)
Estimating the decoherence time using quantum functional inequalities.

Environment Induced Decoherence is a physical concept which provides a dynamical explanation to the disappearance of quantum phenomenon in the real world. Intuitively, it states that a quantum system is never perfectly isolated, so that quantum correlations disappear due to the action of the environment on the system. Focusing on finite dimensional quantum sys- tems undergoing Markovian evolutions, we will discuss how we can adapt the theory of functional inequalities, namely hypercontractivity and log-Sobolev inequalities, to estimate the speed of decoherence. This study relies on the analysis of some new non-commutative norms called amalgamated norms. Surprisingly, we shall show several atypical behaviors compared to the known classical case.
This is a joint work with Cambyse Rouzé (Cambridge).

— 15h15 - 16h15 : **Antti Knowles** (Genève)
Local law and eigenvector delocalization for supercritical Erdős-Rényi graphs.

We consider the adjacency matrix of the Erdős-Rényi graph $G(N, p)$ in the supercritical regime $pN > C \log N$ for some universal constant C. We show that the eigenvalue density is with high probability well approximated by the semicircle law on all spectral scales larger than the typical eigenvalue spacing. We also show that all eigenvectors are completely delocalized with high probability. Both results are optimal in the sense that they are known to be false for $pN < logN$.
A key ingredient of the proof is a new family of large deviation estimates for multilinear forms of sparse vectors.
Joint work with Yukun He and Matteo Marcozzi.

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