# Mathematics Seminar
# of the
# University of Luxembourg
# in cooperation with the
# Luxembourg Mathematical Society

**November 2007**

**6 November 2007, at 5 pm** **Room 3.04 bs**

Georges Habib
Max Planck Institute, Leipzig

**A new lower bound for eigenvalues of the Dirac operator**

Abstract

In this talk, we give a new estimate for the eigenvalues of the Dirac operator on a compact spin manifold in terms of an appropriate endomorphism $E^\psi$ of the tangent bundle associated with an eigenspinor $\psi$. We then show that, for isometric immersions and Riemannian flows (local Riemannian submersions), the limiting case could be achieved. In this case, the tensor $E^\psi$ is identified with the second fundamental form of the immersion while it is identified with the O'Neill tensor of the flow.

**13 November 2007, at 5 pm** **Room 3.04 bs**

Anne Pichereau
Centre de Recerca Matemàtica, Barcelona

**Formal deformations of Poisson structures in low dimensions**

Abstract

As in the classical cases of associative or Lie brackets, there is a cohomology that governs the existence of formal deformations and the existence of extensions of deformations of

Poisson structures. This cohomology is the so-called Poisson cohomology. In this talk, we consider a family of Poisson structures on the affine space of dimension 3, $F^3$, and a family of singular Poisson surfaces in $F^3$, both families being associated to weight-homogeneous polynomials that admit an isolated singularity. We then explain how we obtain an explicit formula for all formal deformations of these Poisson structures, using some results of Poisson cohomology. We also give some interesting properties for these deformations.

**20 November 2007, at 5 pm** **Room 3.04 bs**

Giovanni Peccati
University Paris 6

**High-frequency asymptotics on the sphere and Clebsch-Gordan random walks**

Abstract

We discuss high-frequency central limit theorems on homogeneous spaces, and how they can be expressed in terms of convolutions of Clebsch-Gordan coefficients. These coefficients appear in unitary matrices connecting reducible representations of $SO(3)$. This allows reinterpreting part of our results in terms of coupling of angular momenta in a quantum mechanical system. An important motivation for our research comes from the probabilistic representation and the statistical analysis of the Cosmic Microwave Background (CMB) radiation.

This is based on joint works with D. Marinucci (Rome).

**27 November 2007, at 5 pm** **Room 3.04 bs**

Michel Emery
University of Strasbourg

**Elementary spectral properties of some 3-tensors**

Abstract

As everyone knows, any symmetric matrix diagonalizes in an orthonormal basis, and several symmetric matrices commute with each other if and only if they share a common diagonalization.

We shall discuss similar properties for some symmetric tensors with three indices instead of two.