

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

June, 2012

Tuesday, June 5 , 2012, at 17:00

Campus Kirchberg, Room B02

Eric Hoffbeck
(University of Paris 13)

Operads and rewriting

Abstract:

An operad is an algebraic structure which models the properties (associativity, commutativity and other relations) of a category of algebras. As for groups and algebras, rewriting methods exist to determine a basis when a presentation by generators and relations is given. I will recall the definition of an operad and explain how rewriting methods work in this context. I will give several examples and applications throughout the talk.

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

June, 2012

Friday, June 22 , 2012, at 14:00

Campus Kirchberg, Room A17

Erlend Grong
(University of Bergen, Norway)

Sub-Riemannian structures on infinite dimensional manifolds

Abstract:

Ever since Arnold in 1966 showed that the Euler equation for an ideal fluid can be thought of as geodesic equations with respect to a Riemannian structure on the group of volume preserving diffeomorphisms, there has been an interest in developing a theory of Riemannian manifolds for infinite dimensional manifolds. Several known PDEs, such as the Burgers' equation and KdV, can be seen as geodesic equations in this framework. The topic of the talk will be to discuss a generalization of sub-Riemannian manifolds to the infinite dimensional setting. A sub-Riemannian manifold is a manifold with a metric that is only defined on a sub-bundle of the tangent bundle. Such manifolds appear in kinematic systems where there is a nonholonomic constraint, but also other types of systems, such as charged particles under the influence of the Lorentz force, can be given a sub-Riemannian interpretation. The talk will describe the generalization and the motivation behind it, and will also give some examples.

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

June, 2012

Tuesday, June 26, 2012, at 17:00

Campus Kirchberg, Room B02

Mathew Penrose
(University of Bath)

Joint work with Antoine Gloria (INRIA, Lille)

Random parking and rubber elasticity

Abstract:

Renyi's random parking process on a domain D in d -space is a point process with hard-core and no-empty-space properties that are desirable for modelling materials such as rubber. It is obtained as follows: particles arrive sequentially at uniform random locations in D , and are rejected if they violate the hard-core constraint, until the accepted particles saturate D .

We describe how any real-valued functional on this point process, provided it enjoys certain subadditivity properties, satisfies an averaging property in the thermodynamic limit. Consequently in this limit, one has a convergence of macroscopically-defined energy functionals for deformations of the point process, to a homogenized limiting energy functional. We may also apply the results to derive laws of large numbers for classical optimization problems such as travelling salesman on the parking point process.