

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

July, 2012

Tuesday, July 3, 2012, at 17:00

Campus Kirchberg, Room B02

Günther Trautmann  
( University of Kaiserslautern )

**Bubble tree compactification of moduli spaces of vector bundles on surfaces**

Abstract:

In general the compactification of a moduli space of stable vector bundles on a projective variety is embedded in a complete Maruyama scheme of corresponding semistable sheaves on that variety. Motivated by the Taubes-Uhlenbeck bubbling for Yang-Mills connections, a first construction of compactifications is described whose boundaries consist of vector bundles on trees of surfaces, as an algebraic counterpart. This is done for rank 2 vector bundles on surfaces. The new moduli spaces are algebraic spaces arising as quotients by group actions. As an example, the compactification of the space of stable rank 2 vector bundles with Chern classes  $c_1 = 0$ ,  $c_2 = 2$  on the projective plane can be described in more detail.

(see arXiv:1110.6525 or Cent. Eur. J. Math. 10(4), 1331-1355, 2012)

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**July, 2012**

**Tuesday, July 10 , 2012, at 17:00**

**Campus Kirchberg, Room B02**

Josef Šilhan  
( University of Masaryk, Brno, Czech Republic )

**Commuting linear operators and decompositions**

Abstract:

We study linear operators  $P = P_0P_1\dots P_s$  with mutually commuting factors. The motivating example is provided by polynomials  $P_i = P_i[D]$  in a single operator  $D$ . Under certain algebraic conditions we express the null space and the range of  $P$  in terms of null spaces and ranges of the factors  $P_i$ . This will be applied to the case where  $D$  is the form Laplacian on pseudo-Riemannian manifolds. Considering more generally multipolynomials  $P_i$ , we show how to deal with constant coefficient linear PDE's in a similar way as we solve constant coefficient linear ODE's in undergraduate calculus.

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**July, 2012**

**Tuesday, July 24 , 2012, at 17:00**

**Campus Kirchberg, Room B02**

Ping Xu  
( University of Penn State )

**Prequantization and  $S^1$ -gerbes**

Abstract:

We describe a prequantization result for  $S^1$ -gerbes extending the well-known result of Weil and Kostant. Some application to symplectic geometry will be discussed.

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**July 2012**

Thursday, July 26, 2012 at 15:30

Campus Kirchberg, room A02

**Yves LeJan**  
(Université Paris Sud)

**Markov loops**

Poisson ensembles of Markov loops are naturally defined by almost any Markov process. They can be put in relation with many stochastic processes of interest in specific examples.

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**July 2012**

Thursday, July 26, 2012 at 14:00

Campus Kirchberg, room A02

**Feng-Yu Wang**  
(Beijing Normal University)

**Generalized Curvature Condition for Subelliptic Diffusion Processes**

By using a general version of curvature condition, derivative inequalities are established for a large class of subelliptic diffusion semigroups. As applications, the Harnack/cost-entropy/cost-variance inequalities for the diffusion semigroups, and the Poincaré/log-Sobolev inequalities for the associated Dirichlet forms in the symmetric case, are derived.