MATHEMATICS SEMINAR
of the
UNIVERSITY OF LUXEMBOURG
in cooperation with the
LUXEMBOURG MATHEMATICAL SOCIETY

**May 2009**

**12 May 2009, at 5 pm** **Room 3.04 bs**

Erkko Lehtonen
University of Luxembourg

**Reducts of Mal'cev's iterative algebra and generalizations of relations**

Abstract

Let A be a fixed nonempty set. A clone on A is a set of operations on A that contains all projections and is closed under composition. Clones can be defined equivalently as the universes of Mal'cev's iterative algebras that contain all projections. It is well-known that the (locally closed) clones on A can be characterized as sets of operations that preserve sets of relations on A. This preservation relation induces a Galois connection between operations and relations, known as the Pol-Inv theory. The closed classes of operations and the closed classes of relations on finite domains were first described, by explicit closure conditions, by Geiger and independently by Bodnarchuk, Kaluzhnin, Kotov and Romov, and these results were extended to infinite domains by Szabó and independently by Pöschel.

In this talk, we will survey reducts of the full iterative algebra and discuss how their subuniverses can be characterized by preservation of certain variants of relations. Corresponding Galois theories have been established by Pippenger, Hellerstein, Couceiro, Foldes, and recently by the current author.

**19 May 2009, at 5 pm** **Room 3.04 bs**

Stephan Sturm
TU Berlin

**A General Approach to Small-Time Large Deviations for Sample Paths of Infinite Dimensional Symmetric Dirichlet Processes with Applications to the Wasserstein Diffusion**

Abstract

Symmetric diffusions on a Polish space can be characterized via local, quasi-regular symmetric Dirichlet forms. We define a suitable pointwise intrinsic metric associated to the Dirichlet form which allows us to introduce the notion of energy (with respect to this intrinsic metric) of a sample path. Under mild assumptions – which imply the necessary exponential tightness – we prove a general small-time sample path large deviation principle for diffusions on a Polish space. As concrete application of this general approach we derive the small time large deviations for the Wasserstein diffusion on the space of probability measures on the unit interval.

**26 May 2009, first talk at 3:45 pm** **Room 3.04 bs**

Kira Adaricheva
Yeshiva University, New York

**On complex algebras of subalgebras**

Abstract

The modes are idempotent and entropic algebras known for the outstanding property that all their subalgebras form a mode of their own, with the same basic operations as the original algebra. Inspired by this example, we are looking at the more general picture when the algebra may bring to formation of an algebra of its subalgebras. It turns out the necessary and sufficient condition is the so-called generalized entropic property that holds in the (variety generated by) given algebra. We will discuss several open questions, in particular a hypothesis that every idempotent algebra with the generalized entropic property is a mode. The talk is based on joint research with A.Pilitowska (Warsaw University of Technology) and D. Stanovsky (Charles University, Prague).

**26 May 2009, second talk at 5 pm** **Room 3.04 bs**

Aklexey Sevastyanov
University of Aberdeen

**Algebraic group analogues of the Slodowy slices and deformed Poisson W-algebras**

Abstract

We define algebraic group analogues of the Slodowy transversal slices to adjoint orbits in a complex semisimple Lie algebra $\mathfrak{g}$. The new slices are transversal to the conjugacy classes in an algebraic group with Lie algebra $\mathfrak{g}$. These slices are associated to the pairs $(p,s)$, where $p$ is a parabolic subalgebra in $\mathfrak{g}$ and $s$ is an element of the Weyl group $W$ of $\mathfrak{g}$. To each element $s$ of the Weyl group we also naturally associate a parabolic subalgebra $p$ such that one can construct the slice associated to the pair $(p,s)$. In the algebraic group framework simple Kleinian singularities are realized as the singularities of the fibers of the restriction of the conjugation quotient map to the slices associated to pairs $(b,s)$, where $b$ is a Borel subalgebra in $\mathfrak{g}$ and $s$ is an element of $W$ whose representative in $G$ is subregular. We also define some Poisson structures on the slices associated to the pairs $(p,s)$. These structures are analogous to the Poisson structures introduced by DeBoer, Tjin and Premet on the Slodowy slices in complex simple Lie algebras. The quantum deformations of these Poisson structures are known as $W$-algebras of finite type. One of applications of our construction gives rise to new Poisson structures on the coordinate rings of simple Kleinian singularities.