"A cluster algebras day"
Pisa

2 Febbraio 2015

Program

9:00-9:40 Registration and Coffee

10:00-10:40 **Clair Amiot**: "Derived invariants for surface algebras"

11:00-11:40 **Alfredo Najera Chavez**: "Frobenius orbit categories and cluster algebras"

12:00-12:40 **Philippe Lampe**: "Almost periodic sequences attached to non-crystallographic root systems"

Lunch

15:00-15:40 **Jan Geuenich**: "Species with potentials of finite mutation type"

Coffee

16:00-16:40 **Charlotte Ricke**: "Approaches to τ-tilting theory for infinite dimensional algebras"

17:00-17:40 **Yann Palu**: "From cluster tilting to homotopical algebra"

18:00-18:40 **Pierre-Guy Plamondon**: "A(nother) generalized multiplication formula"

Titles and Abstracts

Clair **Amiot**: "Derived invariants for surface algebras"

Abstract: Let (S, M) be unpunctured surface with marked points, with genus g and b boundary components. A surface algebra arises from a cut of an ideal triangulation of (S, M). In a joint work with Yvonne Grimeland, we associate to any surface algebra and any generating set of the fundamental group of S, an element in $\mathbf{Z}^{2g+b}$. We show that this element determines the derived equivalence class of the algebra up to homeomorphism of the surface. In this talk I will explain this result, the main ingredients of the proof, and the information we can deduce on the corresponding derived categories.

Alfredo **Najera Chavez**: "Frobenius orbit categories and cluster algebras"

Abstract: We study orbit categories associated to Frobenius categories in a general framework. We apply our main result in the context of Nakajima categories associated to Dynkin quivers to obtain explicit categorifications of families of cluster algebras with coefficients. In particular, we obtain a 2-Calabi-Yau realization of all skew-symmetric cluster algebras of finite type with universal coefficients.

Philippe **Lampe**: "Almost periodic sequences attached to non-crystallographic root systems"

Abstract: We study Fomin-Zelevinskys mutation rule in the context of non-crystallographic root systems. In particular, we construct almost periodic sequences of real numbers for the non- crystallographic root systems of rank 2 by adjusting the exchange relation for cluster algebras. Moreover, we describe a matrix mutation class in rank 3.

Jan **Geuenich**: "Species with potentials of finite mutation type"

Abstract: In the first part, I describe how to associate a species with a given skew- symmetrizable matrix B. I introduce potentials for these species and explain how species with potentials can be mutated. In the second part, I focus on matrices B of finite mutation type. These are (with a few exceptions) precisely the adjacency matrices of triangulations of Riemann surfaces with marked and orbifold points. For each such triangulation we have constructed a species with potential. Our construction guarantees that triangulations related by the flip of an arc i give rise to species with potentials related by the mutation at i. This is joint work with Daniel Labardini Fragoso.

Charlotte **Ricke**: "Approaches to τ-tilting theory for infinite dimensional algebras"

Abstract: The notion of τ-tilting theory for finite-dimensional algebras was introduced by Adachi, Iyama and Reiten in 2012. The 'slogan' to keep in mind on τ-tilting theory is that it completes classical tilting theory from the viewpoint of 'mutation'. That is, it yields an appropriate model of the combinatorics of cluster algebras in a module category. In this work we present possible approaches on how to generalise their results to infinite dimensional algebras. We particularly concentrate on a special class of algebras, the (completed) string algebras. Butler and Ringel gave a purely combinatorial description of the finitely generated modules and their Auslander-Reiten sequences for finite-dimensional string algebras. The classification of finitely generated modules was recently generalised by Crawley-Boevey for infinite dimensional string algebras. We now alter his methods to obtain the classification for completed string algebras.

Yann **Palu**: "From cluster tilting to homotopical algebra"

Abstract: Motivated by the theory of cluster algebras, Buan-Marsh-Reiten proved that some quotients of cluster categories are module categories. More generally, some subquotients (associated with rigid objects) of Hom-finite triangulated categories have been shown to be module categories. In their paper entitled "From triangulated categories to module categories via localisation", Aslak Buan and Robert Marsh proved that these module categories can also be recovered as certain localisations of the triangulated categories under consideration. Our aim in this talk is to give a homotopical algebra point of view on their result.

Pierre–Guy **Plamondon**: "A(nother) generalized multiplication formula"

Abstract: I will present a multiplication formula for cluster characters in 2-Calabi-Yau triangulated categories which generalizes the one proved by Palu. This formula enables one to reobtain, Dominguez and Geiss' formula for almost-split triangles. This will be a report on a joint work with B.Keller and F.Qin.