Seminario especial de teoría de representaciones de álgebras

Marzo 21 y 22 de 2019

1 Programa

Jueves 21 de marzo de 2019

16:00h-17:00 Michael Shapiro (Michigan Satate University)
Darboux coordinates on the Poisson space of triangular bilinear forms.

17:15h-18:15h Jonathan Wilson (IMUNAM)
Expansion formulae for quasi-cluster algebras

Viernes 22 de marzo de 2019

10:30h-11:30h Christof Geiss (IMUNAM)
Rigid indecomposable modules and real Schur roots

11:45h-12:45h Mindy Huerta (IMUNAM)
n-Cotorsion pairs

13:00h-14:00h Anna Felikson (Durham University)
Mutations of non-integer quivers: finite mutation type

2 Resúmenes

Michael Shapiro: Darboux coordinates on the Poisson space of triangular bilinear forms (Joint with L. Chekhov). In this project we give a construction of a system of Darboux-type coordinates on the space of unipotent upper triangular bilinear forms equipped with the Poisson structure discovered by A. Bondal in 1995. Some special cases of low dimensional symplectic leaves were identified earlier by L. Chekhov and M. Mazzocco with the Poisson algebras of hyperbolic length functions where Darboux-type coordinates are obtained by hyperbolic lengths of special system of loops.

Utilizing the construction of Fock-Goncharov coordinates for flat SL_N connections on the disc with 3 marked points on the boundary, we compute Darboux-type coordinates for the maximal symplectic leaves.

Jonathan Wilson: Expansion formulae for quai-cluster algebras. Introduced by Dupont and Palesi, quasi-cluster algebras are cluster structures arsing from 'triangulated' non-orientable surfaces. Specifically, each cluster variable corresponds to the lambda length of an arc appearing in a triangulation. Fixing an initial triangulation, and therefore an initial set of cluster variables, one can express any subsequent cluster variable in terms of the initial ones. In this talk we will investigate the behaviour of these expressions. In particular, following the work of Musiker, Schiffler and Williams we will assign certain graphs to these arcs. In doing so, we find expansion formulae of the cluster variables in terms of perfect matchings of these graphs.

Christof Geiss Hahn: Rigid indecomposable modules and real Schur roots (Joint with B. Leclerc and J. Schröer). Let C be a symmetrizable generalized Cartan matrix with symmetrizer D and orientation Ω. In previous work we constructed for any field $\mathbb{F}$ an $\mathbb{F}$-algebra $H := H_{\mathbb{F}}(C, D, \Omega)$, defined in terms of a quiver with relations, such that the locally free H-modules behave in many aspects like representations of a hereditary algebra $\widetilde{H}$ of the corresponding type. We introduce a Noetherian algebra $\hat{H}$ over a power series ring, which provides a direct link between the representation theory of H andof $\widetilde{H}$. There are reduction and a localization functors relating the module categories of $\hat{H}$, $\widetilde{H}$ and H. These are used to show that there are natural bijections between the sets of isoclasses of tilting modules over the three algebras $\hat{H}$, $\widetilde{H}$ and H. This allows us to show that the indecomposable rigid locally free H-modules are parametrized, via their rank vector, by the real Schur roots associated to (C, Ω). Moreover, the left finite bricks of H, in the sense of Asai, are parametrized, via their dimension vector, by the real Schur roots associated to (C^T, Ω).

Mindy Huerta: n-Cotorsion pairs (Joint with O. Mendoza and M.A. Pérez)

Motivated by some properties satisfied by Gorenstein projective and Gorenstein injective modules over an Iwanaga-Gorenstein ring, we present the concept of left and right n-cotorsion pairs in an abelian category $\mathcal{C}$. Two classes $\mathcal{A}$ and $\mathcal{B}$ of objects of $\mathcal{C}$ form a left n-cotorsion pair $(\mathcal{A}, \mathcal{B})$ in $\mathcal{C}$ if the orthogonality relation $\mathsf{Ext}^i_{\mathcal{C}}(\mathcal{A}, \mathcal{B}) = 0$ is satisfied for indexes $1 \leq i \leq n$, and if every object of $\mathcal{C}$ has a resolution by objects in $\mathcal{A}$ whose syzygies have $\mathcal{B}$-resolution dimension at most $n-1$. This concept and its dual generalise the notion of complete cotorsion pairs, and has an appealing relation with left and right approximations, especially with those having the so called unique mapping property.

The main purpose of this talk is to describe several properties of n-cotorsion pairs and to establish a relation with complete cotorsion pairs. We also give some applications in relative homological algebra, that will cover the study of approximations associated to Gorenstein projective, Gorenstein injective and Gorenstein flat modules and chain complexes, as well as m-cluster tilting subcategories.

Anna Felikson: Mutations of non-integer quivers: finite mutation type. Given a skew-symmetric non-integer (real) matrix, one can construct a quiver with non-integer weights of arrows. Such a quiver can be mutated according to usual rules of quiver mutation. We classify non-integer quivers of finite mutation type and prove that all of them admit some geometric interpretation (either related to orbifolds or to reflection groups). In particular, the reflection group construction gives rise to the notion of quivers of finite and affine types. We also study exchange graphs of quivers of finite and affine types in rank 3. The talk is based on joint works with Pavel Tumarkin and Philipp Lampe.