1

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$\ker t_M \longrightarrow M \xrightarrow{t_M} M \longrightarrow \operatorname{coker} t_M \xrightarrow{\cong} M \otimes k$

$\ker t_N \longrightarrow N \xrightarrow{t_N} N \longrightarrow \operatorname{coker} t_N \xrightarrow{\cong} N \otimes k$

$\ker t_P \longrightarrow P \xrightarrow{t_P} P \longrightarrow \operatorname{coker} t_P \xrightarrow{\cong} P \otimes k$

$0 \longrightarrow \ker f \hookrightarrow G \longrightarrow G/\ker f \longrightarrow 0$

$0 \longrightarrow Hom_R(A, K) \longrightarrow Hom_R(A, L) \longrightarrow \cdots$

XXVI
ESCOLA DE
ÁLGEBRA

UFPR | 50 ANOS

CURITIBA, PR | 1972-2022

UFPR CNPq INCTMat FAPESP CAPES

Timetable

Conference Schedule

	Mon 30	Tue 31	Wed 01	Thu 02	Fri 03
8h00-8h50	Minicourses: 4, 6, 7				
9h00-9h50	Minicourses: 1, 2, 9				
10h00-10h30	Coffee Break				
10h30-11h20					
11h30-12h20					
12hh30-14h20	Lunch				
14h20-16h40	Thematic sessions				
16h40-17h10	Coffee Break and Posters				
17h10-18h30	Thematic sessions				

On 01/02, wednesday, there will be no Thematic Sessions in the afternoon.

List of Thematic Sessions and related Posters

Thematic sessions schedule

	Mon 30	Tue 31	Wed 01	Thu 02	Fri 03
14h20-16h40	Thematic sessions				
16h40-17h10	Coffee Break and Posters				
17h10-18h30	Thematic sessions				

S7 - Representations of Algebras

Organizers: Eduardo do Nascimento Marcos (IME-USP), Kostiantyn Iusenko (USP), Edson Ribeiro Alvares (UFPR).

	Mon 30	Tue 31	Wed 01	Thu 02	Fri 03
14h20-15h00	Agustin Cañadas	Marcelo Lanzilotta	Free	Claudia Fonseca	Viktor Chust
15h10-15h50	Monique Rocha	Ricardo Souza	Free	Leonardo Silva	Willian Velasco
16h00-16h40	Pedro Hernandez	Samuel Quirino	Free	Grasiela Martini	Marco Bullones
16h40-17h10	Coffee	Coffee	Coffee	Poster Session	Coffee
17h10-17h50	Wesley Batista	João Matheus Giraldi	Free	Graziela Fonseca	
Chair-person	Ibrahim Assem	Sonia Trepode	Free	Marcelo Lanzilotta	Agustin Cañadas

Talks

Solutions of the Yang-Baxter equation arising from Brauer Configuration Algebras

Agustin Moreno Cañadas   **TS**

Universidad Nacional de Colombia

The Yang-Baxter equation (YBE) was introduced by Yang [4] in 1967 in his works related to theoretical physics, and by Baxter [2] in his works related to statistical mechanics.

Since its introduction, YBE has stimulated research in many fields of mathematics (Hopf algebras, quandles, Lie (super)algebras, groups, Etc.). It is worth pointing out that the full classification of its solutions remains an open problem.

Recently, Ballester-Bolinches et al. [1] used the structure of the permutation group and its corresponding Cayley graph to give set-theoretical solutions of the YBE via braces, which are new algebraic structures introduced by Rump. Braces allow giving set-theoretical solutions to the YBE.

In this talk, we describe braces induced by specializations of some Brauer configuration algebras. These algebras are multiserial algebras introduced recently by Green and Schroll.

References

[1] Ballester-Bolinches et al., The structure group and the permutation group of a set-theoretical solution of the quantum Yang-Baxter equation. Mediterranean Journal of Mathematics 145 (no.18), 2021, 1-23.

[2] R.J. Baxter, Partition function for the eight-vertex lattice model. Ann. Phys. 70 (1972), 193-228.

[3] N. Florita, Introduction to the Yang-Baxter equation with open problems. Axioms 1, (2012), 33-37.

[4] C.N. Yang, Some exact results for the many-body problem in one dimension with repulsive delta-function interaction. Phys. Rev. Letters 19, 1967, 1312-1315

Partial (co)actions of Taft and Nichols Hopf algebras on their base fields

Grasiela Martini

TS

Universidade Federal do Rio Grande do Sul

In this work we determine all partial actions and partial coactions of Taft and Nichols Hopf algebras on their base fields. Furthermore, we prove that all such partial (co)actions are symmetric. These results are developed in [1].

Joint work with Leonardo Duarte Silva (Universidade Federal do Rio Grande do Sul - UFRGS) and Graziela Langone Fonseca (Instituto Federal Sul Rio-Grandense - IFSul).

[1] G. Fonseca, G. Martini and L. Silva. Partial (co)actions of Taft and Nichols Hopf algebras on their base fields, International Journal of Algebra and Computation, 31(07) (2021) 1471-1496.

A Partial Weak Smash Coproduct

Graziela Langone Fonseca

TS

Instituto Federal Sul-rio-grandense

Motivated by coactions of weak bialgebras on coalgebras [1], in this work we introduce the definition of partial coactions of weak bialgebras on coalgebras as well as a family of examples. Moreover, we investigate induced partial comodules coalgebras from global ones, giving another way to find examples of partial coactions of weak Hopf algebras on coalgebras. We establish a dual relationship between the structures of partial action and partial coaction of a weak bialgebra on a coalgebra. Finally, we introduce the partial weak smash coproduct and give conditions to construct a weak Hopf algebra.

Joint work with Grasiela Martini (Universidade Federal do Rio Grande do Sul - UFRGS) and Eneilson Campos Fontes (Universidade Federal do Rio Grande - FURG)

[1] Yu. Wang, L. Yu. Zhang, *The Structure Theorem for Weak Module Coalgebras*, Mathematical Notes 88 (1), 3-17 (2010).

On finite-dimensional Nichols algebras over dual Radford algebras

João Matheus Jury Giraldi

TS

Universidade Federal do Rio Grande do Sul

Recently in [GGi], it were classified the finite-dimensional Nichols algebras over the simple modules of $^{\mathcal{K}}_{\mathcal{K}}\mathcal{YD}$ where $\mathcal{K}$ is the smallest non-pointed non-cosemisimple Hopf algebra. It turns out to be that $\mathcal{K}$ belongs to the family of the dual Radford algebras [R, ACE] and the generalized lifting method can be applied to this family. In this talk, we explain how to obtain the finite-dimensional Nichols algebras associated to the simple modules of $^{H}_{H}\mathcal{YD}$ with H in the family above using a recent result of N. Andruskiewitsch and I. Angiono [AA]. We also give explicit presentations for some of these Nichols algebras. This talk is based in a joint work with D. Bagio, G. García and O. Márquez.

References

[AA] N. Andruskiewitsch and I. Angiono. Nichols algebras over basic Hopf algebras, Math. Zeitschrift, 296, 1429–1469 (2020).

[ACE] N. Andruskiewitsch, J. Cuadra and P. Etingof, On two finiteness conditions for Hopf algebras with nonzero integral, Ann. Sc. Norm. Super. Pisa Cl. Sci. XIV (2) (2015) 401–440.

[GGi] G. A. García and J. M. J. Giraldi. On Hopf algebras over quantum subgroups, J. Pure and Applied Alg. 223 (2019) 738–768.

[R] D. E. Radford, On the coradical of a finite-dimensional Hopf algebra, Proc. Amer. Math. Soc. 53 (1975) 9–15.

Partial (co)actions of Taft and Nichols Hopf algebras on algebras

Leonardo Duarte Silva

TS

Universidade Federal do Rio Grande do Sul

In [1], we determine all partial actions and partial coactions of Taft and Nichols Hopf algebras on their base fields and prove they are all symmetric. In this work, we extend these results by characterizing suitable partial (co)actions of these two families of Hopf algebras on algebras - further than the base field. These results are developed in [2].

Joint work with Grasiela Martini (Universidade Federal do Rio Grande do Sul - UFRGS) and Graziela Langone Fonseca (Instituto Federal Sul Rio-Grandense - IFSul).

[1] G. Fonseca, G. Martini and L. Silva. Partial (co)actions of Taft and Nichols Hopf algebras on their base

fields, International Journal of Algebra and Computation 31(07) (2021), 1471-1496.

[2] G. Fonseca, G. Martini and L. Silva. Partial (co)actions of Taft and Nichols Hopf algebras on algebras, arXiv e-prints (2022), arXiv:2208.05141

GLIT algebras

Marcelo Lanzilotta

Universidad de la República

Since M. Auslander proposed the concept of repdim, (classifying Artin algebras of finite representation type), passing through the statement (with the level of conjecture until 2004) that every Artin algebra has repdim less than or equal to three, arriving at the homological tools defined by Igusa and Todorov in 2005 (IT functions), and later the definition of Igusa-Todorov algebras defined by J. Wei in 2009 (IT-algebras), we define the LIT (2021) and GLIT algebras (work in progress), generalising the previous concepts.

Joint works with:

Generalised Igusa-Todorov functions and Lat-Igusa-Todorov algebras: Diego Bravo, Octavio Men-doza, José Armando Vivero (J. Algebra 580, 2021);

GLIT-algebras: José Armando Vivero (in development).

Homological and homotopical aspects of Gorenstein categories relative to GP-admissible and GI-admissible pairs

Marco Antonio Pérez Bullones

Instituto de Matemática y Estadística - Universidad de la República

In this talk we define a suitable categorical setting on which it is possible to construct hereditary abelian model structures whose (co)fibrant objects are Gorenstein objects relative to GI-admissible (GP-admissible) pairs. The latter are concepts which comprise the minimal requirements to have nice homological properties for relative Gorenstein objects (for instance, closure properties within short exact sequences or the possibility to construct left or right approximations). We call these settings 'Gorenstein categories relative to G-admissible triples'. The homotopy categories of the mentioned model structures are equivalent to the stable category of Gorenstein objects relative to a certain self Ext-orthogonal class. We give applications of these results depending on the choices of G-admissible triples.

Algebraic structures in group-theoretical fusion categories

Monique Müller Lopes Rocha

Universidade Federal de São João del-Rei

It was shown by Ostrik (2003) and Natale (2017) that a collection of twisted group algebras in a pointed fusion category serve as explicit Morita equivalence class representatives of indecomposable, separable algebras in such categories. We generalize this result by constructing explicit Morita equivalence class representatives of indecomposable, separable algebras in group-theoretical fusion categories. This is achieved by providing the functor Φ from a pointed fusion category to a group-theoretical fusion category with a monoidal structure. Our algebras of interest are then constructed as the image of twisted group algebras under Φ. We also show that twisted group algebras admit the structure of Frobenius algebras in a pointed fusion category, and we establish a Frobenius monoidal structure on Φ as well. As a consequence, our algebras are Frobenius algebras in a group-theoretical fusion category, and like twisted group algebras in the pointed case, they also enjoy several good algebraic properties. This is a joint work with Y. Morales, J. Plavnik, A. Ros Camacho, A. Tabiri e C. Walton.

On a deformation theory of finite dimensional modules over infinite dimensional algebras

Pedro Jesus Hernandez Rizzo

TS

Universidade de Antioquia

In this talk we will show some recent advances as well as applications of a deformation theory of finite dimensional modules over a special class of infinite dimensional k-algebras, where k is an algebraically closed field of any characteristic. These results can be interpreted as a generalization of the theories in [BV] and [FGRV]. This is a joint work with Jose Vélez-Marulanda (Valdosta, USA) and Diego López (UdeA, Colombia).

References

[BV] Bleher, F. M., and Vélez-Marulanda, J. A. (2012). Universal deformation rings of modules over Frobenius algebras. Journal of Algebra, 367, 176-202.

[FGRV] Fonce-Camacho, A., Giraldo, H., Rizzo, P., and Vélez-Marulanda, J. A. (2021). On a deformation theory of finite dimensional modules over repetitive algebras. Algebras and Representation Theory, 1-22.

Tilting Theory of pseudocompact modules over pseudocompact algebras

Ricardo Luiz dos Santos Souza

TS

Universidade Federal de Minas Gerais

In this talk we aim to establish the main results of Tilting Theory for pseudocompact modules over pseudocompact algebras – from a version of the Brenner-Butler Theorem for pseudocompact modules (which has a partial result by Wang in 1998 and the full result by Simson in 2008), to a more recent result by me which asserts the existence of a tilting pseudocompact complement for some partial-tilting pseudocompact modules (which is, itself, a version of a result by Coelho and Angeleri-Hügel in 2001).

A functorial approach to Gabriel quiver constructions

Samuel Amador dos Santos Quirino

Universidade de São Paulo

In the 60's, Peter Gabriel presented a famous result, known nowadays as Gabriel's Theorem, which classified the representations of finite type of a finite dimensional basic (unital associative) algebra (over an algebraically closed field k) in a combinatorial way via Gabriel quiver and the path algebra. These results had a big impact in representation theory and many developments followed over the years. In a joint work with Kostiantyn Iusenko and John MacQuarrie, we define these constructions in a functorial way, which wield an adjucntion and, as corollary, we obtain the important theorem that every pointed pseudocompact algebra is isomorphic to a quotient of a complete path algebra by an admissible ideal. In this talk, I will present these results and discuss some generalizations.

Generalized bound path algebras

Viktor Chust Bugno Pires de Almeida

Universidade de São Paulo

The generalized path algebras were introduced in (Coelho, Liu, 2000), in order to generalize the well-known concept of path algebras over a quiver. In order to construct a generalized path algebra, we associate an algebra to each vertex of a quiver (instead of only the base field as it happens with ordinary path algebras), and we consider paths intercalated by elements from the algebras to form a vector space basis of the generalized path algebra. Multiplication is then naturally defined by concatenation of paths and using the multiplications of the algebras in each vertex. In a recent work joint with Flávio U. Coelho, we have introduced the generalized bound path algebras, by considering the quotient of a generalized path algebra by an ideal generated by relations on the quiver. The aim of this talk is to introduce these concepts, discuss when a given algebra is isomorphic to a generalized bound path algebra, and make some comments on how this can be interesting to analyse representation-theoretical properties of that algebra. This work was produced under supervision by Dr. Flávio Ulhoa Coelho (IME-USP) and the authors acknowledge financial support by São Paulo Research Foundation (grant FAPESP 2018/18123-5 and 2020/13925-6).

Secções no quiver de Auslander-Reiten da Categoria Derivada de álgebras hereditárias por partes

Wesley dos Santos Villela Batista

Universidade Federal do Paraná

Neste trabalho será apresentado um método intrínseco para a construção de uma secção na componente transjectiva de $\Gamma(D^b(mod A))$, em que A é uma álgebra hereditária por partes de radical quadrado zero. Mais especificamente iremos trabalhar com álgebras do tipo manso, dadas por $A = kQ/R^2$, em que Q

é um quiver que possui uma certa propriedade.

A álgebra parcial de um grupo como a álgebra de convolução de uma categoria inversa

Willian Goulart Gomes Velasco

TS

Universidade Federal do Paraná

Ações parciais de grupo formam um campo teórico (em teoria de representações, álgebra de operadores e afins) que engloba as ações de grupo usuais. Assim como estas, ações parciais induzem a definição de uma álgebra de grupo, aqui chamada de álgebra parcial de grupo. Nesta palestra discorreremos sobre as estruturas algébricas envolvidas na definição de tal álgebra parcial. Isto nos motivará a (re)interpretar tais fatos do ponto de vista categórico. Em particular, por meio de ações fibradas de categorias inversas em conjuntos. Este trabalho foi realizado em colaboração com Marcelo M. Alves (UFPR); apresentaremos resultados ainda não publicados decorrentes da tese de doutoramento do palestrante, o trabalho intitulado Algebras of expanded structures.

Posters

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$$1 \quad 1 \quad 1 \quad \cdots\cdots \quad 1 \quad 1 \quad 1$$

$$0 \qquad 0$$

$$\ker t_M \longrightarrow M \xrightarrow{\ t_M\ } M \to \operatorname{coker} t_M \xrightarrow{\simeq} M \otimes k$$

$$\ker t_N \longrightarrow N \xrightarrow{\ t_N\ } N \to \operatorname{coker} t_N \xrightarrow{\simeq} N \otimes k$$

$$\ker t_P \longrightarrow P \xrightarrow{\ t_P\ } P \to \operatorname{coker} t_P \xrightarrow{\simeq} P \otimes k$$

$$0 \qquad 0 \qquad\qquad 0$$

$$0 \longrightarrow \ker f \hookrightarrow G \longrightarrow G/\ker f \longrightarrow 0$$

$$0 \longrightarrow \operatorname{Hom}_R(A, K) \longrightarrow \operatorname{Hom}_R(A, L) \longrightarrow \cdots$$