PARS

Partial Actions and Representations Symposium

11-15 May 2014 • Gramado, Brazil • mtm.ufsc.br/~exel/PARS/

PROGRAM & SCHEDULE

PARTIAL ACTIONS AND REPRESENTATIONS SYMPOSIUM

Gramado, 11 May 2014

Welcome to the first edition of PARS. This is in fact the second meeting dedicated to Partial Actions and Representations, the first one being the "I Workshop de Ações Parciais e Representações Parciais", which took place in Porto Alegre from November 19–21, 2012.

We wish you a pleasant and productive stay here in Gramado.

Sincerely,

The Organizing Committee
Dirceu Bagio
Misha Dokuchaev
Ruy Exel
Antonio Paques
Alveri Santana

PARS

May 11-15, 2014

Sunday	Monday		Tuesday		Wednesday		Thursday	
Arrival and Registration	9:00 9:30	**Abertura**	8:30 9:30	**Patial Actions – Mini Course**	8:30 9:30	**Patial Actions – Mini Course**	8:30 9:30	**Patial Actions – Mini Course**
	9:30 10:30	**Patial Actions – Mini Course**	9:40 10:30	***Marcelo Laca*** Quantum equilibrium and self similarity	9:40 10:30	***Ruy Exel*** Partial crossed products and endomorphisms	9:40 10:20	***Daiana Flôres*** Graduação por Grupóide: Contexto de Morita e Semiprimalidade
	10:30 10:50	Coffee Break	10:30 10:50	Coffee Break	10:30 10:50	Coffee Break	10:20 10:40	Coffee Break
	10:50 11:40	***Jean Renault*** Partial semigroup actions and groupoids	10:50 11:40	***Enrique Pardo*** A unified treatment of Katsura and Nekrashevych algebras	10:50 11:40	***Fernando Abadie*** Dilations of partial representations	10:40 11:20	***Charles Starling*** Self-Similar Graph Actions and Partial Crossed Products
	11:45 12:35	***Daniel Gonçalves*** Simplicity of partial skew group rings and Leavitt path algebras	11:45 12:35	***Miguel Ferrero*** Twisted partial actions of groups on semiprime rings	11:45 12:35	***Alcides Buss*** Actions of inverse semigroups on groupoids by partial equivalences	11:25 12:15	***Eliezer Batista*** Partial actions of Hopf algebras, and Hopf algebroids
	12:35 14:00	Lunch	12:35 14:00	Lunch	12:35 14:00	Lunch	12:15 14:00	Lunch
	14:00 14:50	***Pere Ara*** Algebras associated to separated graphs	14:00 14:50	***Misha Dokuchaev*** Twisted partial actions, partial projective representations and cohomology	14:00 - 19:00	Passeio por Gramado e Canela	14:00 14:25	***Andrea Morgado*** Uma questão de Bergman para anéis graduados por grupóides
	14:55 15:35	***Marcelo Muniz Alves*** Partial gradings of algebras	14:55 15:35	***Dirceu Bagio*** On the separability of the partial skew groupoid ring			14:30 15:10	***Wagner Cortes*** Description of partial actions
	15:40 16:20	***Liza Clark*** C*-algebras associated to quotient maps	15:40 16:20	***Alveri Sant'Ana*** On the semiprime and semiprimitive smash product questions			15:15 15:30	**Encerramento**
	16:20 16:50	Coffee Break	16:20 16:50	Coffee Break				
	16:50 17:40	***Benjamin Steinberg*** Associative algebras associated to étale groupoids and inverse semigroups	16:50 17:40	***Juan Jacobo Simón Pinero*** Morita Equivalence of Partial Actions and Globalization				
	17:45 18:10	***Thaísa Tamusiunas*** About the Galois correspondence for groupoid actions in the noncommutative case	17:45 18:10	***Sarádia Della Flora*** Ações parciais torcidas e anéis de Goldie				
	18:15 18:40	***Daiane Freitas*** Galois correspondences for partial Galois-Azumaya-Hopf extensions	18:15 18:40	***Héctor Pinedo*** Hilbert's 90 Theorem for Partial Actions				
	18:45 19:10	***Mykola Khrypchenko*** Extensions of semilattices of groups arising from partial actions of groups	18:45 19:30	Posters				

PARS - PARTIAL ACTIONS AND REPRESENTATIONS SYMPOSIUM
GRAMADO, RS - MAY 11-15, 2014

I. Mini course: Partial Actions of Groups and Hopf Algebras

by Ruy Exel, Mikhailo Dokuchaev, Antonio Paques, and Eliezer Batista.

II. Plenary Talks:

1. Fernando Abadie. *Dilations of partial representations*

ABSTRACT. We will show that any partial representation on a module has a distinguished dilation to a representation by linear isomorphisms. In the case of partial representations on Hilbert spaces we will show how to obtain dilations by means of Morita equivalence of Fell bundles. Time permitting, we will indicate a third dilation theorem for partial representations, this time for certain interaction groups.

2. Pere Ara. *Algebras associated to separated graphs*

ABSTRACT. A separated graph is a pair (E, C), where E is a directed graph, $C = \bigsqcup_{v \in E^0} C_v$, and C_v is a partition of $r^{-1}(v)$ (into pairwise disjoint nonempty subsets) for every vertex v. We will introduce the theory of C^*-algebras and Leavitt path algebras of separated graphs, which has been recently developed by Goodearl and the presenter. These algebras allow to incorporate the Leavitt algebras of any type (m, n) into the theory of graph algebras. We will also outline some of the basic facts on the construction by Exel and the presenter, attaching to a finite bipartite separated graph (E, C) a partial dynamical system $(\Omega(E, C), \mathbb{F}, \alpha)$ and the corresponding crossed product algebra. The theory will be illustrated with several representative examples. In particular the algebras associated to universal (m, n)-dynamical systems, the semigroup algebras of the free inverse monoids of finite rank and the group algebra of the lamplighter group appear as examples of this construction (often throught a Morita-equivalence). If time permits, we will outline some applications to paradoxical decompositions.

3. Eliezer Batista. *Partial actions of Hopf algebras, and Hopf algebroids*

ABSTRACT. The purpose of this talk is to present the connection between Hopf algebroids and partial actions of Hopf algebras. This link is stablished by means of partial representations of Hopf algebras. given any Hopf algebra H, there exists a universal Hopf algebroid, H_{par}, which factorizes every partial representation of H by an algebra morphism. The very existence of this Hopf algebroid allows one to construct the monoidal category of partial H modules, whose algebra objects are the usual partial actions.We explicitly present some structural results concerning this Hopf algebroid and present some examples of the Hopf algebroid H_{par} and the category of partial H modules as well.

4. Alcides Buss. *Actions of inverse semigroups on groupoids by partial equivalences*

ABSTRACT. In this talk we are going to define actions of inverse semigroups on topological groupoids by partial (Morita) equivalences, generalizing partial actions of groups on spaces. From such actions, we construct Fell bundles over inverse semigroups and non-Hausdorff etale groupoids. This gives examples of Fell bundles over non-Hausdorff etale groupoids that are not Morita equivalent to an action by automorphisms and hence shows that the Packer-Raeburn Stabilisation Trick cannot be extended to non-Hausdorff groupoids. This is joint work with Ralf Meyer.

5. Mikhailo Dokuchaev. *Twisted partial actions, partial projective representations and cohomology*

Abstract. The concept of a partial group action was worked out in the theory of operator algebras in order to endow important classes of C^*-algebras, such as the approximately finite dimensional algebras and the Cuntz-Krieger algebras, with the structure of a more general crossed product. The notions of a (continuous) twisted partial action of a locally compact group on a C^*-algebra and of the corresponding crossed product were introduced in [4]. A purely ring theoretic treatment of twisted partial group actions was given in [1].

The concept of a twisted partial action of a group G on a ring A involves a function, called twisting, whose values are invertible multipliers of some ideals of A and which satisfy the 2-cocycle equality in some restricted sense. Thus one naturally wonders what kind of cohomology theory would fit this notion. It is well-known that the Schur multiplier of a group G is isomorphic to $H^2(G, \mathbb{C}^*)$, where G acts trivially on $\mathbb{C}^*$, and one of the reasons to introduce the theory of partial projective group representations in [3] was to create more background for the desired cohomology theory. The notion of the partial Schur multiplier $pM(G)$ of G appeared naturally and it was shown that $pM(G)$ is a semilattice of abelian groups, called components of $pM(G)$.

In order to derive the concept of partial 2-cohomology from that of a twisted partial action one assumes that A is commutative. Then a twisted partial action of G on A falls into two parts: a partial action α of G on A and its twisting. With an additional assumption that α is unital (which means that the domains involved in α are generated by central idempotents), one obtains the concept of a 2-cocycle (the twisting) whose values belong to groups of invertible elements of appropriate ideals of A. The notion of a partial 2-coboundary then follows from that of an equivalence of twisted partial actions introduced in [2]. Replacing A by a commutative multiplicative monoid, one comes to the definition of the second cohomology group $H^2(G, A)$. Thus instead of a usual G-module we deal with a partial G-module, which is a commutative monoid A with a unital partial action α of G on A. The groups $H^n(G, A)$ with arbitrary n are defined in a similar way. Next one asks how to obtain these groups using resolutions. This is done by relating partial group cophomology with Lausch's cohomology of inverse semigroups [3]. We also show that each component of the partial Schur multiplier pM(G) is a union of 2-cohomology groups with values in some, in general non-trivial, partial G-modules.

References

[1] M. Dokuchaev, R. Exel, J. J. Simón, *Crossed products by twisted partial actions and graded algebras*, J. Algebra, **320** (2008), (8), 3278–3310.
[2] M. Dokuchaev, R. Exel, J. J. Simón, *Globalization of twisted partial actions*, Trans. Am. Math. Soc., **362** (2010), (8), 4137–4160.
[3] M. Dokuchaev, B. Novikov, *Partial projective representations and partial actions*, J. Pure Appl. Algebra, **214** (2010), 251–268.
[4] R. Exel, *Twisted partial actions: a classification of regular C^*-algebraic bundles*, Proc. London Math. Soc., **74** (1997), (3), 417–443.
[5] H. Lausch, *Cohomology of inverse semigroups*, J. Algebra, **35** (1975), 273–303.

6. Ruy Exel. *Partial crossed products and endomorphisms*

Abstract. Many C^*-algebras that can be described as a partial crossed product, also admit a description as a "crossed product by an endomorphism" relative to a given "transfer operator". While the former notion is already well known among algebraists, the latter does not seem to have featured in purely algebraic developments. My purpose in this lecture is to advertise this important construction by means of the example of the Cuntz-Krieger algebras (the C^*-version of Leavitt path algebras) showing how the two descriptions relate to each other.

7. Miguel Ferrero. *Twisted partial actions of groups on semiprime rings*

Abstract. Partial actions of groups have been defined and studied first in C^* algebras by R. Exel. Then they have been studied and applied in several other areas of mathematics. In a pure algebraic context, partial actions of groups on algebras have been introduced and studied by M. Dokuchaev and R. Exel. Later on twisted partial actions appeared in a paper by the same authors and J. Simon. In this lecture we consider twisted partial actions of groups on semiprime rings. We give a survey of results published in several papers.

7. Daniel Gonçalves. *Simplicity of partial skew group rings and Leavitt path algebras*

ABSTRACT. Let R_0 be a commutative ring, G a group and α a partial action by ideals that contain local units. In this talk we will describe a simplicity criterion for the partial skew group ring $R_0 \rtimes G$ in terms of maximal commutativity and $G-$ simplicity of R_0. We will also sketch how to use this result to give a new proof of the simplicity criterion for Leavitt path algebras.

8. Marcelo Laca. *Quantum equilibrium and self similarity*

ABSTRACT. We consider a family of Cuntz-Pimsner algebras associated to self-similar group actions, and their Toeplitz analogues. Both families carry natural dynamics implemented by automorphic actions of the real line, and we investigate the equilibrium states (the KMS states) for these dynamical systems. This is joint work with Iain Raeburn, Jacqui Ramagge and Michael Whittaker.

9. Enrique Pardo. *A unified treatment of Katsura and Nekrashevych algebras*

ABSTRACT. In this talk we study a family of C^*-algebras generalizing both Katsura algebras and Nekrashevych algebras. This is a joint work with Ruy Exel (UFSC, Brazil).

10. Jean Renault. *Partial semigroup actions and groupoids*

ABSTRACT. My talk is a by-product of a recent work with D. Williams on the amenability of some groupoid extensions. Our initial motivation was the study of topological higher rank graph algebras. It turns out that our results apply more generally to semidirect product groupoids associated to partial semigroup actions and their boundary actions.

11. Juan Jacobo Simón Pinero. *Morita Equivalence of Partial Actions and Globalization*

ABSTRACT. For a large class of partial actions of groups on rings, called regular, we shall present the notion of Morita equivalence and we will see that any regular partial action is Morita equivalent to a globalizable one, and that the globalization is essentially unique. We shall also see that Morita equivalent s-unital partial actions on rings with orthogonal local units are stably isomorphic. In addition, we will see that Morita equivalent s-unital partial actions on commutative rings must be isomorphic, and an analogous result for C^*-algebras will be also established.

12. Benjamin Steinberg. *Associative algebras associated to étale groupoids and inverse semigroups*

ABSTRACT. Groupoid C*-algebra form an important class of operator algebras encompassing Cuntz-Krieger algebras, cross-products of groups with commutative C*-algebras and inverse semigroup algebras.

Cuntz-Krieger algebras have discrete analogs called Leavitt path algebras; inverse semigroups also have discrete algebras. Motivated by the similarities between the continuous and discrete versions in these two contexts I introduced an associative algebra associated to an ample groupoid over any base ring. Inverse semigroup algebras and Leavitt path algebras are examples. The hope is that groupoids can be used to explain the commonalities between the continuous and discrete settings.

In this talk I survey some recent progress in this area by the speaker and others.

III. Talks:

1. Marcelo Muniz Alves. *Partial gradings of algebras*

ABSTRACT. In this talk we consider partial gradings of algebras by a finite group G, i.e., partial coactions of the group algebra kG. We will do so via the correspondence between partial (right) coactions of kG and partial (left) actions of the dual group algebra $(KG)^*$. Applying results of partial representations of Hopf algebras to the algebra $(KG)^*$, we describe a class of partial gradings of matrix algebras, associated to the so-called elementary or "good" gradings of the matrix algebra $M_n(K)$. We also describe the structure of a $\mathbb{Z}_2$-partial grading of an algebra. This is a joint work with Eliezer Batista and Joost Vercruysse.

2. Dirceu Bagio. *On the separability of the partial skew groupoid ring*

ABSTRACT. Given a partial action of a groupoid on a ring $\mathcal{A}$ we can construct the corresponding partial skew groupoid ring. In this talk we consider under what conditions this corresponding partial skew groupoid ring is a separable extension of $\mathcal{A}$. This is a joint work with H. Pinedo.

3. Liza Clark. *C^*-algebras associated to quotient maps*

ABSTRACT. In this talk, I will discuss the groupoid C^*-algebras $C^*(R(\psi))$ associated to the equivalence relation $R(\psi)$ induced by a quotient map $\psi : Y \to X$. If Y is Hausdorff then $C^*(R(\psi))$ is a Fell algebra, and if both Y and X are Hausdorff then $C^*(R(\psi))$ has continuous trace. Astrid an Huef, Iain Raeburn and I show that the C^*-algebra $C^*(G)$ of a locally compact, Hausdorff and principal groupoid G is a Fell algebra if and only if G is topologically isomorphic to some $R(\psi)$, extending a theorem of Archbold and Somerset.

4. Wagner Cortes. *Description of partial actions*

ABSTRACT. We study partial action on k-algebras over a field. We start by describing the partial action on an indecomposable algebra, in terms of global actions. Then we work in a general algebra with a given decomposition as indecomposable algebra and give a description of the partial action, also in terms of global actions. This is a joint work with Eduardo Marcos

5. Daiana Flôres. *Graduação por Grupóide: Contexto de Morita e Semiprimalidade*

ABSTRACT. Sejam K um anel comutativo com unidade, G um grupo finito e A um anel G-graduado. Em [1] M. Cohen e S. Montgomery estabelecem uma relação entre A-módulos graduados e $A\#(KG)^*$-módulos. A partir disto, constroem um contexto de Morita $[A_e, A, A, A\#(KG)^*]$, onde e é o elemento neutro de G. Neste trabalho, estudamos este mesmo problema para o caso em que A é um anel graduado por um grupóide finito $\mathcal{G}$. Além disso, usamos tal contexto de Morita para apresentar condições necessárias e suficientes para que um certo subanel de $A\#(K\mathcal{G})^*$ seja semiprimo.

REFERENCES

[1] M. Cohen and S. Montgomery, *Group-Graded Rings, Smash Products and Group Actions*, Transactions of the American Math. Soc. **282(1)** (1984), 237-258.

6. Charles Starling. *Self-Similar Graph Actions and Partial Crossed Products*

ABSTRACT. A recent construction of Exel and Pardo of a C^*-algebra associated to a self-similar graph action generalizes C^*-algebras associated to self-similar groups as well as C^*-algebras constructed by Katsura. Using results of Milan and Steinberg, we show that under certain conditions, a C^*-algebra of this type is isomorphic to a partial crossed product. We illustrate this using the odometer as an example. This is joint work with Ruy Exel.

7. Alveri Sant'Ana. *On the semiprime and semiprimitive smash product questions*

ABSTRACT. This talk will be a kind of survey about the problem of knowing when a smash product $A\#H$ is semiprime (resp. semiprimitive) in case of a semissimple Hopf algebra H partially acting on a H-semiprime (resp. H-semiprimitive) algebra A.

IV. Communications:

1. Sarádia Della Flora *Ações parciais torcidas e anéis de Goldie*

Abstract. Neste trabalho consideramos uma ação parcial torcida α de um grupo G sobre um anel semiprimo A. Mostramos que:

(i) Se $A *_\alpha G$ é um anel semiprimo de Goldie à esquerda, então A é um anel semiprimo de Goldie à esquerda.

(ii) Se G é um grupo finito e A é um anel livre de $|G|$-torção, então A é um anel semiprimo de Goldie à esquerda se e somente se $A *_\alpha G$ é semiprimo de Goldie à esquerda.

(iii) O resultado dado no item (ii) pode ser obtido no caso em que G é um grupo policíclico infinito ou quando G é policíclico por finito e α é uma ação parcial torcida de tipo finito.

2. Daiane Freitas. *Galois correspondences for partial Galois-Azumaya-Hopf extensions*

Abstract. In this talk we present necessary and sufficient conditions for the partial smash product $A\#_\alpha H$ to be Azumaya, in terms of separability, Hirata-separability and Galois conditions. Furthermore, we establish Galois correspondences for partial Galois-Azumaya-Hopf extensions.

3. Mykola Khrypchenko. *Extensions of semilattices of groups arising from partial actions of groups*

Abstract. Let A be a semilattice with 1 of (not necessarily abelian) groups and G be a group. Following [3] and [3] we introduce a class of extensions of A (called extensions of A by G) which turn out to be, up to equivalence, the partial crossed products $A *_\Theta G$ for certain (unital) twisted partial actions [1] Θ of G on A. In the abelian case such a Θ reduces to a pair (θ, f), where θ endows A with the structure of an inverse partial G-module [3] and f is a partial 2-cocycle [3] of G with values in the module (A, θ). We prove that the equivalence classes of extensions of (A, θ) by G are in a one-to-one correspondence with the elements of the second partial cohomology [3] group $H^2(G, A)$. Moreover, for a split extension of (A, θ) by G the set of conjugacy classes of splittings is characterized in terms of $H^1(G, A)$.

References

[1] M. Dokuchaev, R. Exel, J. J. Simón, Crossed products by twisted partial actions and graded algebras, *Journal of Algebra*, **320** (2008), no. 8, 3278–3310.

[2] M. Dokuchaev, M. Khrypchenko, Partial cohomology of groups, *Preprint*. `http://arxiv.org/abs/1309.7069`

[3] H. Lausch, Cohomology of inverse semigroups, *J. Algebra*, **35** (1975), 273–303.

4. Andrea Morgado. *Uma questão de Bergman para anéis graduados por grupóides*

Abstract. Consideraremos A uma álgebra graduada por um grupo finito G. Denotamos por $J(A)$ o radical de Jacobson de A e $J_G(A)$ o radical de Jacobson graduado de A. Em [1], Bergman conjecturou que $J_G(A) \subseteq J(A)$. Esta questão foi resolvida afirmativamente por M. Cohen e S. Montgomery em [2]. Nesta apresentação respondemos esta questão para o caso de anéis graduados por grupóides.

References

[1] G. Bergman, *On Jacobson Radicals of Graded Rings*, Notas não publicadas.

[2] M. Cohen and S. Montgomery, *Group-Graded Rings, Smash Pro- ducts and Group Actions*, Transactions of the American Mathematical Society, 282(1), 1984, 237-258.

5. Héctor Pinedo *Hilbert's 90 Theorem for Partial Actions*

Abstract. The cohomological version of Hilbert's Theorem 90 states that given a finite Galois extension of fields E/L with Galois group G, then the first cohomology group $H^1(G, L^*)$ is trivial. A generalization of this classical result to the context of Galois extension of commutative rings was obtained in [1], where the authors showed that if S/R is a Galois extension of commutative rings with Galois group G, then $H^1(G,\mathcal{U}(R)) = 0$, provided that the Picard group $\mathbf{Pic}(R)$ of R is trivial.

In this talk Hilbert's Theorem 90 will be considered for partial group actions, where we prove that if α is a partial action of a group G on a commutative ring S such that S/S^α is a partial Galois extension [2], then the partial cohomology group [3] $H^1(G, \alpha, S^\alpha)$ is trivial when $\mathbf{Pic}(S^\alpha) = 0$.

This result was obtained in collaboration with Mikhailo Dokuchaev and Antonio Paques.

References

[1] S.U. Chase, D.K. Harrison, A. Rosenberg, Galois theory and Galois cohomology of commutative rings, *Mem. Amer. Math. Soc.* **52** (1965), 15–33.
[2] M. Dokuchaev, M. Ferrero and A. Paques, *Partial actions and Galois theory.* J. Pure Appl. Algebra **208** (2007), 77–87.
[3] M. Dokuchaev, M. Khrypchenko, Partial cohomology of groups, arXiv:1309.7069.

6. Marlon Soares. *Simplicidade do produto cruzado parcial*

Abstract. Neste trabalho, estudamos condições necessárias e suficientes para a simplicidade do produto cruzado parcial. Além disso, descrevemos completamente o centro e estudamos a comutatividade do produto cruzado parcial.

7. Thaísa Tamusiunas. *About the Galois correspondence for groupoid actions in the noncommutative case*

Abstract. Let R be a Galois extension of R^G with Galois group G and $J_g = \{r \in R \mid rg(x) = xr$, for all $x \in R\}$. K. Sugano, G. Szeto and L. Xue showed in different works that the set of $C(R)$-modules $\{J_g \mid g \in G\}$, where $C(R)$ is the center of R, plays an important role for noncommutative Galois theory (see [1], [2], [3], [4], [5]). For a groupoid G acting on a ring R via an action $\beta = (\{E_g\}_{g\in G}, \{\beta_g\}_{g\in G})$, whose ideals E_g are unitary for each $g \in G$, we define J_g in a similar way, as being the set of the elements r in E_g such that $r\beta_g(x1_{g^{-1}}) = xr$, for all $x \in R$. In this presentation, we shall give necessary and sufficient conditions for the Galois map to be injective in the case of groupoids acting on rings, in terms of $\{J_g \mid g \in G\}$. We also show a characterization for a central β-Galois algebra which satisfies the fundamental theorem. In fact, we shall prove that a central β-Galois extension R satisfies the fundamental theorem if and only if for each separable R^β-subalgebra S of R, the commutator $V_R(S)$ is equal to $\bigoplus_{g\in H_S} J_g$, where $H_S = \{g \in G|\ \beta_g(s1_{g^{-1}}) = s1_g, \forall s \in S\}$.

References

[1] K. Sugano, *On a Special Type of Galois Extensions*, Hokkaido Math. Journal, 9 (1980) 123-128.
[2] G. Szeto; L. Xue, *The structure of Galois Algebras*, Journl of Algebra, 237(1) (2007), 238-246.
[3] G. Szeto; L. Xue, *On Galois Algebras Satisfying the Fundamental Theorem*, Comm. Algebra, 35(12) (2007), 3979-3985.
[4] G. Szeto; L. Xue, *On Galois Extensions with aa Inner Galois Group*, Recent developments in algebra and relates areas, Adv. Lect. Math. (ALM), 8, Int. Press, Somerville, MA (2009), 239-245.
[5] G. Szeto; L. Xue, *On Galois Extensions with a One-to-One Galois Map*, International Journal of Algebra, Vol. 5, nº17 (2011), 801-807.

V. Posters:

1. Viviane M. Beuter. *Partial crossed products as equivalence relation algebra*

ABSTRACT. Pretende-se, neste trabalho, dar versões puramente algébricas de alguns resultados conhecidos na teoria de C*-produto cruzado parcial. Abadie (ver [1]) prova a caracterização de C*-produtos cruzados parciais como C*-álgebras de grupóides, para o caso de ações parciais livres de grupos enumeráveis que agem em C*-álgebras comutativas com unidade. Neste trabalho, o grupóide é visto como uma relação de equivalência étale. Na segunda parte, generaliza-se a relação entre os bem conhecidos sistemas dinâmicos parciais e C*-sistemas dinâmicos parciais ao nível puramente algébrico. Em seguida, avança-se para generalizar o resultado de Abadie, ou seja, mostra-se que partial skew group ring" de uma ação parcial algébrica livre em um conjunto é isomorfa a uma álgebra de funções com suporte finito sobre uma relação de equivalência. Para isso, o corpo dos números complexos é substituído por um corpo qualquer K, espaços localmente compactos Z são trocados por conjuntos X, e as C*-álgebras comutativas $C_0(Z)$ são substituídas pelas K-álgebras $F_0(X)$ de funções com valores em K e com suporte finito em X. Para finalizar, usa-se esse resultado para caracterizar os ideais em partial skew group ring em termos de de subconjuntos R-invariantes.

REFERENCES

[1] F. Abadie, *On partial actions and groupoids*, Proc. Amer. Math. Soc. 132 (2004), 1037-1047.

2. Felipe Castro. *Globalization for partial H-bimodule algebras*

ABSTRACT. It will be defined a globalization for a partial H-bimodule algebra, extending the notion given by E. Batista and M. M. Alves [1]. It will be shown that every partial H-bimodule algebra has a globalization. This is a joint work with Glauber Quadros.

REFERENCES

[1] M. M. Alves and E. Batista, *Enveloping Actions for Partial Hopf Actions*, Comm. Algebra 38 (2010), 2872-2902

3. Rafael Cavalheiro. *On the semiprimality and semiprimitivity problem for the partial smash products*

ABSTRACT. Let H be a finite-dimensional semisimple Hopf algebra over a field $\Bbbk$ and A a partial H-module algebra. In this work we discuss the semiprimitivity and the semiprimality of the partial smash product problem, studying the H-prime and the H-Jacobson radicals of A and its relations with the prime and the Jacobson radicals of $\underline{A\#H}$, respectively. In particular, we prove that if A is H-semiprimitive, then $\underline{A\#H}$ is semiprimitive provided that all irreducible right representations of A are finite-dimensional, or A is a PI-algebra that is affine over $\Bbbk$ and $\Bbbk$ is a perfect field, or A is locally finite. Moreover, we prove that $\underline{A\#H}$ is semiprime provided that A is an H-semiprime PI-algebra, generalizing results of Linchenko and Montgomery.

4. Helder Geovane Gomes de Lima. *Partial Schur multiplier*

ABSTRACT. The partial Schur multiplier $pM(G)$ of a group G is a generalization of the classical Schur multiplier $M(G)$. While its classical version is a group, $pM(G)$ is a semilattice of abelian groups $pM_D(G)$ (called components), indexed by certain subsets $D \subseteq G \times G$. Each component $pM_D(G)$ consists of partially defined functions $\sigma\colon G \times G \to K$ having D as its domain. Such functions are called partial factor sets of G and are associated to the partial projective representations of G. This work discusses a specific component, $pM_{G\times G}(G)$, which is particularly interesting due to the fact that there are epimorphisms from it to any other component. Assuming that K is an algebraically closed field, we characterize this component for some families of groups, including the dihedral and dicyclic groups. This is a joint work with H. Pinedo.

5. Glauber Quadros. *Globalization for partial H-bicomodule algebras*

ABSTRACT. It will be defined a globalization for a partial H-bicomodule algebra, extending the notion given by E. Batista and M. Muniz Alves [1]. Under the hypothesis that the finite dual H^0 separates points, it will be shown that every partial H-bicomodule algebra has a globalization. This is a joint work with Felipe Castro.

REFERENCES

[1] M. M. Alves and E. Batista, *Enveloping Actions for Partial Hopf Actions*, Comm. Algebra 38 (2010), 2872-2902

6. Mateus Medeiros Teixeira. *O grupo quântico $A(SL_{e^{2\pi i/3}}(2))$ como extensão de Galois fielmente plana*

ABSTRACT. Neste trabalho fazemos uma descrição completa do grupo quântico $A(SL_q(2))$, em que q é a raiz cúbica da unidade, como uma extensão de Hopf-Galois fielmente plana de $A(SL(2,C))$ a partir da sequência exata de álgebras de Hopf

$$A(SL(2,C)) \xrightarrow{Fr} A(SL_q(2)) \longrightarrow A(F)$$

determinada pelo morfismo de Frobenius Fr. Além disso, estendemos o resultado para o subgrupo quântico de Borel, obtendo a estrutura de produto cruzado.