PROGRAM
&
ABSTRACTS

UNIVERSIDADE FEDERAL DE SANTA CATARINA

SBM SOCIEDADE BRASILEIRA DE MATEMÁTICA

CIMPA

fapesc Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina

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INTERNATIONAL MATHEMATICAL UNION IMU

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EMBAJADA DE ESPAÑA EN BRASIL CONSEJERIA CULTURAL

cooperación española

Contents

Presentation

The school will focus on the interplay between dynamics and algebra, introducing participants to key subjects in the study of these interactions: Groupoid convolution algebras and tensor categories. The techniques developed will be applied to Leavitt path algebras, which encode combinatorics and dynamics of graphs.

In recent years groupoids have become a central point in the study of the interplay between dynamics and algebra. We will present an introductory course on convolution algebras associated to groupoids. We will offer two courses in the subject of Leavitt path algebras, one introductory and one advanced. On another axis for the school, we focus on tensor categories. We will present an introductory course in the theory of representations of groups, which will motivate students for the course on finite tensor categories, since the latter encompasses the former. The finite tensor category course will gently introduce the students to the subject, with examples to illustrate the theory and presenting some recent developments in this subject. In this direction we will also offer an advanced course with further applications of tensor categories.

We hope you enjoy the school.

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Abstracts of courses

Introductory Courses

Lia Vas

University of the Sciences, Philadelphia

Introduction to graph algebras and attempts at their classification

After a review of some necessary background in algebra, we introduce classes of algebras related to a directed graph and present a hands-on method of computing their (pointed) K_0-groups. We put most of our focus on Leavitt path algebras, but the methods we present can also be used for other graph algebras.
The examples we present illustrate that the K_0 group does not classify Leavitt path algebras. However, if one considers the grading of these algebras and adjusts the definition of the K_0-group to reflect the existence of this grading, the situation becomes more interesting. The Graded Classification Conjecture states that this adjusted version of the (pointed) K_0-group is a complete invariant of Leavitt path algebras over a field. After presenting some examples illustrating the conjecture, we discuss the context in which this conjecture has been formulated, its current status, its relations with other conjectures, and some ongoing research.

Luz Adriana Mejía Castaño

Universidad del Norte, Colombia

Introduction to group representations

This is an introductory course on finite group representations. The main objective is to show how this theory allows us to obtain structural results on finite groups, showing the importance of studying representations.

Gilles G. de Castro

Universidade Federal de Santa Catarina, Brazil

Daniel W. van Wyk

Dartmouth College,USA

On groupoid algebras with applications to Leavitt labelled path algebras

Often an algebra is built from some underlying object such that properties of the underlying object are reflected in the structure of the algebra. For example, some combinatorial properties of graphs determine certain algebraic properties of Leavitt path algebras and similarly the for a partial dynamical system and its associated partial skew-group ring. Groupoids form a unifying framework for such algebras and provide us with another toolkit to study them.

In the first part of this mini-course, we will introduce basic definitions on ample groupoids and Steinberg algebras associated with them. With a view toward labelled graphs, we will explore how Leavitt path algebras and partial skew-group rings can be realised as Steinberg algebras. We will present select results that are fundamental in the study of such algebras.

In the second part of the mini-course, we will introduce labelled graphs and labelled spaces as well as Leavitt labelled path algebras. This class of algebras generalises both the usual Leavitt path algebras as well as a large class of commutative algebras generated by idempotents. We will give some conditions on partial actions so that their skew-group rings can be realised as Leavitt labelled path algebras.

Mombelli Martin

Universidad Nacional de Córdoba, Argentina

Finite Tensor Categories

A tensor category is an abelian category with a tensor product, a unit object subject to associativity and unity axioms. This concept, introduced by Maclane and Benabou, encodes the category of representations of groups, Lie algebras and more generally of Hopf algebras. Finite tensor categories are tensor categories subject to some finiteness conditions. Basic examples come from the theory of finite dimensional Hopf algebras. Finite tensor categories appear encoding symmetries of distinct mathematical structures. Their applications reach divers areas of mathematics: subfactor theory, statistical mechanics and Hopf algebra theory. This makes the problem of their classification both a highly interesting and difficult one. In this course I will introduce the notion of finite tensor categories and its basic properties. We will present examples to illustrate the theory.

Roozbeh Hazrat

Centre for Research in Mathematics and Data Science

Western Sydney University, Australia

Advanced topics in Leavitt path algebras

The classification of Leavitt path algebras is one of the main topics in the theory which has not yet been completed. Finding a right invariant for classification is one of the major problems in the theory. In this course we concentrate on the Graded Classification Conjecture, describing the notion of graded Grothendieck groups as a possible complete invariant for such algebras. We start with a short introduction on the graded methods in algebras and then describe the graded Grothendieck groups. Along the way we touch on the so called talented monoid of a directed graph which seems to capture a substantial amount of geometry of the graph.

Bojana Femic
MI SANU, Serbia

Bicategories, 2-monads, enriched and internal categories

For this course a preknowledge on monoidal categories is very helpful. The preliminary plan for the three lectures is as follows.

After recalling the definition of a monoidal category we will introduce bicategories and study some examples of them. We will define pseudofunctors between bicategories and we will introduce 2-monads as lax functors from the trivial bicategory. We will also introduce T-algebras in bicategories (over 2-monads T) and compare them to module categories over tensor categories. We will show how a 2-monad in the bicategory Span(C) of spans over a category C with pullbacks is an internal category in C (actually, Benaboú defines them this way in his famous paper from 1967).

We will define double categories, originally introduced by Charles Ehresmann in 1963, as categories internal in Cat_1, the category of categories, and also pseudodouble categories, as categories weakly internal in Cat_1, or internal in the 2-category Cat_2 of categories. The latter is a special case of pseudocategories, introduced by Martins, as categories internal to 2-categories. We will state the Strictification Theorem for double categories and study the relation between bicategories and double categories. We will introduce the bicategory Mat(C) of matrices over a category C will products and illustrate its biequivalence with a sub-bicategory of Span(C), under certain assumptions.

We will show that 2-monads in Mat(C) and in Span(C) are categories enriched, respectively internal in V. We will illustrate the embedding of the category C-Cat (categories enriched over C) into Cat(C) (categories internal in C). We will comment on the analogous result for when C is a certain type of tricategory, and illustrate it with the example of tensor categories and module categories over them. We will also give examples of the latter result in lower dimensions.

Abstracts of talks

Héctor Pinedo Tapia

School of mathematics

Industrial university of Santander, Colombia

Partial actions and Galois theory of commutative rings

The concept of a Galois extension of commutative rings was introduced by Auslander and Goldman (22), in which they laid the foundations for separable extensions and defined the Brauer group of a commutative ring. Later, in (25), Chase, Harrison and Rosenberg developed a Galois theory of commutative rings by giving several equivalent definitions of a Galois extension and specifying, to the case of a Galois extension, the Amitsur cohomology seven terms exact sequence, given by Chase and Rosenberg in (24). The Chase-Harrison-Rosenberg sequence can be viewed as a common generalization of the two most fundamental facts from Galois cohomology of fields: Hilbert's Theorem 90 and the isomorphism of the relative Brauer group with the second cohomology group of the Galois group. When working with abelian groups and having the purpose of presenting a Kummer's theory for commutative rings, Harrison constructed in (32) the group of the isomorphism classes of abelian G-extensions of a commutative ring. Since then much attention have been paid to the sequence and its parts subject to more constructive proofs, generalizations of Harrison's group and analogs in various contexts.

Another point of view is to replace global actions by partial ones. The latter are becoming an object of intensive research and have their origins in the theory of operator algebras, and were initiated by Exel in (31). In the algebraic context, a partial action of a group G on a ring R consists of a family of ring isomorphisms $\alpha : \{\alpha_g : D_{g^{-1}} \to D_g\}_{g\in G}$ such that any D_g is an ideal of R, α_e is the identity map of R and α_{gh} extends $\alpha_g \circ \alpha_h, g, h \in G$. The development of a Galois theory of partial actions was initiated in (27) stimulating a growing algebraic activity around partial actions, while the partial cohomology of groups was introduced and studied in (28).

Having at hand partial Galois theory and partial group cohomology, we may ask now what would be the analog of the Chase-Harrison-Rosenberg exact sequence in the context of a partial Galois extension of commutative rings and to explore Harrison's construction to the context of partial Galois extensions. This talk is based on the papers (23), (29) and (30) where these questions were answered. The interested audience may find some other extension of Chase-Harrison-Rosenberg sequence in (26) and (33).

Mykola Khrypchenko

Universidade Federal de Santa Catarina, Brazil

Crossed modules over inverse semigroups, crossed module extensions and their cohomological interpretation

We introduce the notion of a crossed module over an inverse semigroup which generalizes the notion of a module over an inverse semigroup in the sense of Lausch (34), as well as the notion of a crossed module over a group in the sense of Whitehead (37) and Maclane (36). With any crossed S-module A we associate a 4-term exact sequence of inverse semigroups $A \xrightarrow{i} N \xrightarrow{\beta} S \xrightarrow{\pi} T$, which we call a crossed module extension of A by T. We then introduce the so-called admissible crossed module extensions and show that equivalence classes of admissible crossed module extensions of A by T are in a one-to-one correspondence with the elements of the cohomology group $H^3_{\leq}(T^1, A^1)$, whenever T is an F-inverse monoid.

This is a joint work (35) with Mikhailo Dokuchaev (Universidade de São Paulo) and Mayumi Makuta (Universidade de São Paulo).

Dirceu Bagio

UFSM, Brazil

Representations of the restricted enveloping algebra $\mathfrak{u}(\mathfrak{m})$ in characteristic 2.

Let $\Bbbk$ be an algebraically closed field of characteristic 2 and $\mathfrak{s}$ the unique, up to isomorphism, not restricted simple Lie algebra of dimension 3 over $\Bbbk$ which has basis $\{e, h, f\}$ and bracket $[e, f] = h$, $[e, h] = e$ and $[f, h] = f$. The 2-closure $\mathfrak{m}$ of $\mathfrak{s}$ (that is, $\mathfrak{m}$ is the smallest restricted Lie algebra that contains $\mathfrak{s}$) is a 5-dimensional Lie algebra and its restricted enveloping algebra $\mathfrak{u}(\mathfrak{m})$ is generated by a, b, c with defining relations

$$ef + fe = h,\ eh + he = e,\ fh + hf = f,\ e^4 = f^4 = 0,\ h^2 + h = 0.$$

We prove that $\mathfrak{u}(\mathfrak{m})$ is a special biserial algebra and hence it is of tame representation type (38). The description of all indecomposable modules of a special biserial algebra was given in Proposition 2.3 of (39). They are either string modules or band modules. Using this description, we present explicitly all families of finite-dimensional indecomposable $\mathfrak{u}(\mathfrak{m})$-modules.

We are interested in the representation theory of $\mathfrak{u}(\mathfrak{m})$ by the following reason. Let $\mathscr{B}(V)$ be the restricted Jordan plane in characteristic 2. Consider the Hopf algebra $H = \mathscr{B}(V)\#\Bbbk\mathbb{Z}_2$ and $D(H)$ the Drinfeld double of H. Then there are a central Hopf subalgebra $\mathbf{R}$ of $D(H)$ and an exact sequence $\mathbf{R} \hookrightarrow D(H) \twoheadrightarrow \mathfrak{u}(\mathfrak{m})$ of Hopf algebras. Therefore, we obtain the forgetful functor ${}_{\mathfrak{u}(\mathfrak{m})}\mathcal{M} \to {}_{D(H)}\mathcal{M}$.

This is a joint work with N. Andruskiewitsch, S. D. Flora and D. Flôres.

Guillermo Cortiñas

Facultad de Ciencias Exactas y Naturales

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Bivariant algebraic K-theory and Leavitt path algebras

Bivariant algebraic K-theory, kk, is an algebraic version, defined for algebras over a commutative ring ℓ, of Kasparov's bivariant K-theory KK of C^*-algebras. In the talk I will review diverse aspects of kk, its properties, its relation to KK, its applications to Leavitt path algebras, and some open problems.

Thaísa Tamusiunas

Instituto de Matemática e Estatística

Universidade federal de Porto Alegre, Brazil

Group-type partial actions of groupoids and a Galois correspondence

The usual notion of Galois extension over fields was extended for commutative rings by M. Auslander and O. Goldman in (22). Some years later, the Galois theory over commutative rings was developed by S. U. Chase, D. K. Harrison and A. Rosenberg in (25). They presented several equivalent conditions for the definition of Galois extension. Among the main results, they proved a Galois correspondence in the context of commutative rings. Precisely, if $R \subset S$ is a Galois extension of commutative rings with Galois group G, then there exists a bijective association between the set of subgroups of G and the set of R-subalgebras of S which are G-strong and R-separable.

In the 1990's, R. Exel introduced the notion of partial actions of a group in the theory of operator algebras, see for instance (19) and (20). The same notion in an algebraic context was considered in (17). Particularly, it was defined partial actions of groups on rings which is the key to develop a partial Galois theory. So, the Galois theory for partial actions of groups on rings was presented two years later in (27) generalizing the results of (25).

On the other hand, in the context of category theory, a groupoid is a small category in which every morphism has inverse. However, a groupoid can be seen as a natural generalization of a group. In fact, a groupoid is a set G equipped with a set of identities $\mathsf{G}_0 \subset \mathsf{G}$ and a binary operation defined partially which is associative and, for each $g \in \mathsf{G}$, there exist $g^{-1} \in \mathsf{G}$ such that $g^{-1}g = s(g) \in \mathsf{G}_0$ and $gg^{-1} = t(g) \in \mathsf{G}_0$. If G_0 has a unique element then G is a group. This algebraic version of groupoids motivated the authors of (12) to consider partial actions of groupoids on rings. In particular, it was defined in (12) the notion of Galois extension for partial actions of groupoids. A version of the Galois correspondence for global actions of groupoids on commutative rings was given in (21).

An special class of partial actions of connected groupoids was studied in (14). This class was named *group-type* partial groupoid actions and this name is due to the fact that the partial skew groupoid ring associated can be realized as a partial skew group ring; see details in Theorem 4.4 of (14). It is easy to construct examples of group-type partial actions of groupoids using the formulas given in (4) and (5) of (13). In particular, every global groupoid action is a group-type partial action.

The main contribution of this talk is to show a Galois correspondence for group-type partial actions of groupoids. This correspondence is submitted in a recent paper joint with D. Bagio and A. Sant'Ana (cf. (15)). Precisely, let $\alpha = (S_g, \alpha_g)_{g\in \mathsf{G}}$ be a unital group-type partial action of a connected finite groupoid G on a comutative ring $S = \oplus_{y\in \mathsf{G}_0} S_y$. For each subgroupoid H of G, we consider $\alpha_{\mathsf{H}} = (S_h, \alpha_h)_{h\in\mathsf{H}}$ the partial action of H on $S_{\mathsf{H}} = \oplus_{y\in\mathsf{H}_0} S_y$. Denote by $S^{\alpha_{\mathsf{H}}}$ the subring of invariant elements. On the other hand, G_T denotes the set of elements of G that fix T, where T is a subring of S. Consider the set $\boldsymbol{wSubg}(\mathsf{G})$ whose elements are wide subgroupoids H of G such that α_{H} is group-type. Also, let $\mathbf{B}(S)$ be the set of all subrings T of S which are $S^{\alpha_{\mathsf{G}}}$-separable, α-strong and such that $\mathsf{G}_T = \mathsf{H}$, for some $\mathsf{H} \in \boldsymbol{wSubg}(\mathsf{G})$. With this notation, we have the following Galois correspondence.

Theorem. (Galois Correspondence) *Let S be an α_{G}-partial Galois extension of $S^{\alpha_{\mathsf{G}}}$. There exists a bijective correspondence between $\boldsymbol{wSubg}(\mathsf{G})$ and $\boldsymbol{B}(S)$ given by $\mathsf{H} \mapsto S^{\alpha_{\mathsf{H}}}$ whose inverse is given by $T \mapsto \mathsf{G}_T$.*

The Galois correspondence for not-necessarily connected groupoids follows from the connected case. The previous theorem recover the Galois correspondence for global groupoid actions given in Theorem 4.6 (i) of (21).

Francesca Mantese

Università di Verona, Italy

Injective modules over Leavitt path algebras

Leavitt path algebras have a well-studied, extremely tight relationship with their projective modules. On the other hand, very little is heretofore known about the structure of their injective modules. In a ongoing joint project with Gene Abrams and Alberto Tonolo, we aim to describe the injective modules over an arbitrary Leavitt path algebra $L_K(E)$. In this talk we present some techniques to construct indecomposable injective modules over $L_K(E)$, based on the graph properties of E. As an application, we completely characterize the injective modules over the class of Leavitt path algebras where any vertex is basis of at most one cycle, as for instance the Jacobson algebra.

Yolanda Cabrera Casado

University of Málaga, Spain

Natural families in evolution algebras

The modeling of non-mendelian genetics brought forth a new type of genetic algebras called evolution algebras. Basic concepts of evolution algebras of arbitrary dimension are studied. The notion of the range of evolution, natural vector, and subspace of evolution is introduced, and there is a decomposition of evolution algebras relative to the latter. This is a joint work with Mercedes Siles Molina and Nadia Boudi.

Ben Steinberg

The City College of New York, USA

Simplicity of Nekrashevych algebras of contracting self-similar groups

A self-similar group is a group G acting on the Cayley graph of a finitely generated free monoid X^* (i.e., regular rooted tree) by automorphisms in such a way that the self-similarity of the tree is reflected in the group. The most common examples are generated by the states of a finite automaton. Many famous groups, like Grigorchuk's 2-group of intermediate growth are of this form. Nekrashevych associated C^*-algebras and algebras with coefficients in a field to self-similar groups. In the case G is trivial, the algebra is the classical Leavitt algebra, a famous finitely presented simple algebra. Nekrashevych showed that the algebra associated to the Grigorchuk group is not simple in characteristic 2, but Clark, Exel, Pardo, Sims and Starling showed its Nekrashevych algebra is simple over all other fields. Nekrashevych then showed that the algebra associated to the Grigorchuk-Erschler group is not simple over any field (the first such example). The Grigorchuk and Grigorchuk-Erschler groups are contracting self-similar groups. This important class of self-similar groups includes Gupta-Sidki p-groups and many iterated monodromy groups like the Basilica group. Nekrashevych proved algebras associated to contacting groups are finitely presented.

In this talk we discuss a recent result of the speaker and N. Szakacs (Manchester) characterizing simplicity of Nekrashevych algebras of contracting groups. In particular, we give an algorithm for deciding simplicity given an automaton generating the group. We apply our results to several families of contracting groups like Gupta-Sidki groups, GGS groups and Sunic's generalizations of Grigorchuk's group associated to polynomials over finite fields.

Alfigen Sebandal
MSU, Iligan Institute of Technology, Philippines

A Talented Monoid view on Lie Bracket algebras arising from Leavitt Path algebras

In this talk, we translate known results in simplicity, solvability, and nilpotency of Lie algebras arising from Leavitt Path algebras in the language of Talented monoids. We show that there is a direct relation between solvability and the Gelfand-Kirillov dimension. Moreover, we give a complete new classification of a balloon and shed light to the question when the derived Lie Algebra is simple.

Daniel Gonçalves

UFSC, Brazil

Chaos on ultragraph shift spaces

In this short talk, we introduce ultragraph shift spaces, their metrics, and describe the ultragraphs for which the associated shift space is chaotic. We will also mention some relations of ultragraph shift spaces and ultragraph algebras.

Abstracts of posters

Christian Garcia

PPGMAT, UFRGS, Brazil

A generalized Galois correspondence for finite groupoids

Let R be a ring with unity, $\mathcal{G}$ be a finite groupoid and $\beta = \{\{E_g\}_{g\in\mathcal{G}}, \{\beta_g\}_{g\in\mathcal{G}}\}$ be an action of $\mathcal{G}$ on R. If R is a K_β-ring, we present a one-to-one correspondence between the wide subgroupoids of $\mathcal{G}$ and the subrings of R that are β -admissible. This correspondence recover the one presented by H. F. Kreimer in (10) for group actions, as well as the correspondence presented by A. Paques and T. Tamusiunas in (9) for groupoid actions on commutative rings.

Douglas Finamore

Departamento de Matemática, ICMC/USP, Brazil

Contact actions of $\mathbb{R}^k$ and their underlying foliations

We work with **contact actions** of $\mathbb{R}^k$: objects which generalise to higher dimensions the $\mathbb{R}$-action on a contact manifold induced by the flow of its Reeb field. For such actions one can pose two generalisations of the Weinstein conjecture. We show that the strongest of these conjectures holds in the particular case of closed Riemannian manifolds on which the contact action of $\mathbb{R}^k$ is an action via isometries.

Dzoara Núñez
PPGM
Universidade Federal do Amazonas, Manaus

The Quiver Representation Variety

The goal of quiver representation theory, is classify all representations of a given quiver Q and all morphisms between them up to isomorphism. But some of the algebras associated to a quiver are wild, in the sense that the problem of classification of their representations and their irreducible morphism is difficult or sometimes impossible. The main obstacle in this case is the dependence of the isomorphism classes of representations on arbitrarily many continuous parameters, to which many of the classical tools of the representation theory of algebras do not apply. The aim in this poster is to motivate the geometric approach to the classification problem, from the point of view of Reineke.

We will see that the isomorphism classes of representations of a fixed vector dimension $\mathbf{v}$, have a nice geometric structure. They correspond to orbits of a certain algebraic group GL acting over a certain **variety**. This structure allows us to study the classification of quiver representations using geometric techniques. We will present the above theory and some examples.

Francielle Kuerten Boeing

PPGMTM

UFSC, Florianópolis

Quantum inverse semigroups

The notion of a quantum inverse semigroup is introduced as a linearized generalization of inverse semigroups. Beyond the algebra of an inverse semigroup, which is the natural example of a quantum inverse semigroup, several other examples of this new structure are presented in different contexts, related to Hopf structures. Finally, a generalized notion of local bissections is defined for Hopf algebroids over a commutative base algebra giving rise to new examples of quantum inverse semigroups associated to Hopf algebroids in the same sense that inverse semigroups are related to groupoids.

Igor Alarcon Blatt

Department of Mathematics

Universidade Federal Fluminense, Brazil

Ribbon Categories and RT Invariants

Our main goal is to present the construction of knot invariants from a quasi-triangular Hopf algebra, using the structures present in its category of finite dimensional representations. We'll present the basic definitions for these algebras and, as we go along, introduce a pictorial technique for representing morphisms in these categories in a way that we can relate to knot diagrams. It is well known that the category of finite dimensional representations of the quantum group $U_q(\mathfrak{sl}_2)$ carries the structure of a ribbon category. We present a computer program which computes the associated Reshetikhin–Turaev invariant of an inputted knot.

Juliana Pedrotti
PPGMAT
UFRGS, Brazil

Induced maps of the Galois map for groupoid actions

Any action of a groupoid on a ring (not necessarily commutative) gives rise to a natural map from the set of the subgroupoids into the set of subrings, which we call the Galois map for groupoid actions. In this work we will introduce some induced maps of the Galois map and study relations between them. Furthermore, we give some conditions for the Galois map for groupoid actions to be injective.

Laura Orozco

Department of Mathematics

Universidad Industrial de Santander, Colombia

Leavitt Path Algebras as Partial Skew Group Rings

We realize Leavitt path algebras as partial skew group rings, making a modification to the proposed construction in (8). Also, we will mention some theorems for which it is useful to use this realization.

Matheus Bordin Marchi

PPGMTM

UFSC, Florianópolis

A $\mathcal{C}$-module functor equivalence involving internal Homs

Let $\mathcal{C} = (\mathcal{C}, \otimes, a, l, r, \mathbf{1})$ be a finite tensor category over $\Bbbk$ and $\mathcal{M}$ a left $\mathcal{C}$-module category. For any pair of objects $M, N \in \mathcal{M}$ we can define an object $\underline{Hom}(M, N)$ in $\mathcal{C}$ called internal Hom object from M to N. The object $\underline{Hom}(M, M)$ is an algebra in $\mathcal{C}$ and thus we can define a left $\mathcal{C}$-module category of right $\underline{Hom}(M, M)$-modules denoted as $\mathcal{C}_{\underline{Hom}(M,M)}$. An application of this theory can be seen with an equivalence of $\mathcal{C}$-module categories from $\mathcal{M}$ to $\mathcal{C}_{\underline{Hom}(M,M)}$, whenever the category $\mathcal{M}$ is also exact, indecomposable and $M \in \mathcal{M}$ is simple.

Paolo Saracco

Dep. de Mathématiques

Université Libre de Bruxelles, Belgium

Globalization for Geometric Partial Comodules

The study of partial symmetries (such as partial dynamical systems, partial (co)actions, partial comodule algebras) is a recent field in continuous expansion, whose origins can be traced back to the study of C^*-algebras generated by partial isometries.
One of the central questions in the study of partial symmetries is the existence and uniqueness of a so-called globalization (or enveloping action).
We propose here a unified approach to globalization in a categorical setting and we provide a procedure to construct globalizations in concrete cases of interest.
Our approach relies on the notion of geometric partial comodules.

Wesley G. Lautenschlaeger

PPGMAT

UFRGS, Porto Alegre, Brazil

Partial Actions of Restriction Semigroupoids

Semigroupoids are generalizations of semigroups considering a partially defined binary operation instead of a totally defined one. Many well-known structures arise in this way: groupoids are generalizations of groups and categories are generalizations of monoids. However, the most studied classes of semigroupoids always have inverses or bilateral unities. Our goal is to define unilateral restriction semigroupoids, generalizing unilateral restriction semigroups. Furthermore, aiming to study its partial actions, we define the Szendrei expansion for unilateral restriction semigroupoids and present an Ehresmann–Schein–Nambooripad theorem that relates restriction semigroupoids and weakly locally inductive constellations.

Juan Orendain

Centro de Ciencias Matemáticas

Universidad Nacional Autónoma de México, Mexico

Discrete homotopies and path groupoids of simplicial sets

A discrete path on a simplicial set X is a simplicial map from a triangulation of the standard interval into X. We study different notions of relative homotopy between discrete paths and we study the corresponding path groupoids they define. We consider discrete relative homotopies, discrete thin homotopies and cycle thin homotopies. The groupoids defined define continuous path groupoids as Kan extensions along geometric realization, and thus serve as discrete aproximations to their continuous analogues. We explore the question of how to extend these ideas to higher dimensional cubical/globular groupoids.

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