

Categorificação

Orador: Dirk Hofmann (Aveiro)

Título: Stone-type dualities meet enriched category theory.

Resumo: In this talk we combine two cornerstones of our work over the past years: duality theory and quantale-enriched categories. Arguably the most "famous" duality result is Stone's duality theorem $\mathbf{Stone} \simeq \mathbf{Boole}^{\mathrm{op}}$ stating that the category \mathbf{Stone} of (nowadays called) Stone spaces and continuous maps is dually equivalent to the category \mathbf{Boole} of Boolean algebras and homomorphisms. In some sense, Stone's theorem can be seen as the "mother" of many similar results, typically involving some kind of Stone spaces on one side and some kind of distributive lattices on the other (see [\cite{Joh86}](#), for instance). One of the common features of these dualities is that all involved equivalence functors are liftings of hom-functors into the two-element space resp. lattice. Due to this fact, we can only expect dualities for categories somehow cogenerated by 2 , with appropriate structure.

At this point enters the second cornerstone of our work: the theory of quantale-enriched categories. Our main motivation stems from [\cite{Law73}](#) where metric spaces are studied as categories enriched in the quantale $[0, \infty]$. For technical reasons, we will consider in this talk structures enriched in a quantale based on $[0, 1]$ rather than in $[0, \infty]$; however, the lattices $[0, 1]$ and $[0, \infty]$ are isomorphic, therefore we still talk about metric spaces. Keeping in mind that ordered sets (and hence in particular lattices and Boolean algebras) can be viewed as categories enriched in the two-element quantale 2 , our thesis is **\emph{that the passage from the two-element space to the compact Hausdorff space $[0, 1]$ on one side of the duality should be matched by a move from ordered structures to categories enriched in $[0, 1]$ on the other side}**. Accordingly, in this talk we present duality theory for ordered and metric compact Hausdorff spaces and (suitably defined) finitely cocomplete categories enriched in $[0, 1]$, making use of $[0, 1]$ -enriched versions of the Vietoris monad.

Orador: Benjamin Alarcón-Heredia (Centro de Matemática e Aplicações da Universidade Nova de Lisboa)

Título: Homotopy theory of 2-categories

Resumo: The category of small categories has a Thomason model structure making its homotopy category equivalent to the classical homotopy category of topological spaces. The same is true for small 2-categories, so we can think of 2-categories as spaces. In this talk I will present the different ways in which this can be done, and how to study

certain homotopy constructions applied to these spaces in a purely categorical way. More precisely, I will present generalizations of the homotopy colimit theorem of Thomason and of theorems A and B of Quillen for 2-categories. This was joint work with Antonio M Cegarra and M. Calvo-Cervera

Orador: Rui Carpentier

Título: Tricolorações de Grafos Cúbicos sob o ponto de vista de Operadores Lineares

Resumo: Desde Penrose que se conhece uma relação entre tricolorações de grafos cúbicos e álgebra tensorial. Nesta apresentação vamos mostrar como podemos codificar as tricolorações de um qualquer grafo cúbico (com pontas soltas) numa representação do grafo como operador linear entre espaços lineares. Veremos como estas representações em operadores podem ser decompostas em operadores mais simples com recurso à identidade de Penrose e identidades afins. Isso irá permitir uma outra perspectiva sobre a reducibilidade de configurações locais e levanta algumas questões que iremos analisar.

Orador: Pedro Vaz (Université catholique de Louvain)

Título: Categorification of Verma modules

Resumo: In this talk I will explain how to categorify (all) the Verma modules for quantum sl_2 using a generalization of the categorification, due to Chuang-Rouquier and Frenkel-Khovanov-Stroppel, of the n -dimensional irreducible representation of quantum sl_2 using cohomologies of finite-dimensional Grassmannians and partial flag varieties.

Orador: Volodymyr Mazorchuk (Uppsala University)

Título: Classification problems in 2-representation theory

Resumo: This talk is planned as an overview of some recent developments in 2-representation theory of finitary 2-categories related to classification of various types of 2-representations. The main emphasis will be on classification of "simple" 2-representations for various classes of 2-categories. I plan to present recent results in this direction, describe conjectures and open problems and give an idea where the difficulties to attack those are.