3rd Combinatorics Day - Lisboa, March 2, 2013

Programme

Room C8 2.23
FCUL, Campo Grande, Lisboa

11:00-11:45 Teresa Sousa (CMA, UNL)

Monochromatic Clique Decompositions of Graphs

Abstract: Given graphs G and H and a colouring of the edges of G with k colours, a monochromatic H-decomposition of G is a partition of the edge set of G such that each part is either a single edge or forms a monochromatic graph isomorphic to H. Let $\phi_k(n, H)$ be the smallest number t such that any graph G of order n and any colouring of its edges with k colours admits a monochromatic H-decomposition with at most t parts. Results for the function $\phi_k(n, K_r)$ for $k \geq 2$ and $r \geq 3$ will be presented.

This is joint work with Henry Liu.

11:45-12:30 Paula Rama (CIDMA, UA)

Topological indices: the modified Schultz index

Abstract: A topological index of a graph is a numerical parameter that is mathematically derived from the structure of the graph. Many topological indices emerged in Chemical Graph Theory in the development of new relationships between the physicochemical properties of a molecule and its chemical structure, represented by a graph.
The modified Schultz index, also known as the Gutman index, is defined as

$$S^*(G) = \sum_{\{u,v\} \subset V(G)} d_G(u) d_G(v) dist_G(u, v).$$

In this talk we present some properties of the modified Schultz index of tricyclic graphs with three cycles, that is, connected graphs with exactly three cycles. We also determine the modified Schultz index of several graph products and show some connections with other topological indices.

Joint work with Paula Carvalho.

12:30-14:00 Lunch

14:00-14:45 Aram Emami (CMUC, UC)

A bijective proof of a Lascoux's Cauchy kernel expansion over Ferrers shapes

Abstract: We give a bijective proof of a Lascoux's Cauchy kernel expansion over Ferrers shapes, in the basis of Demazure characters. The proof is given in the framework of Fomin's growth diagrams for generalized Robinson-Schensted-Knuth correspondences, in our case, to obtain pairs of semi-skyline augmented fillings.

14:45-15:30 Samuel Lopes (CMUP, UP)

Combinatorics gone Weyl

Abstract: The multiplication and differentiation operators x and d/dx generate the Weyl algebra. More generally, given a nonzero polynomial $h = h(x)$, let y be the operator $h.d/dx$, so that x and y satisfy the commutation relation $[y, x] = h$. The associative and unital algebra generated by x and y is denoted by $A_h$and it is a subalgebra of the Weyl algebra. For suitable choices of h we obtain the Weyl algebra, the enveloping algebra of the two-dimensional non-abelian Lie algebra, and the Jordan plane. Some interesting combinatorics emerge from the representation theory of the algebras A_h over fields of arbitrary characteristic. We will discuss these and phrase them in the language of partitions.

This is joint work in progress with Georgia Benkart and Matt Ondrus.

15:30-15:45 Coffee/Tea

15:45-16:30 Jorge Neves (CMUC, UC)

Vanishing ideals and Parametrized Linear Codes over Graphs

Abstract: The vanishing ideal of a parametrized linear codes was first studied in detail by Renteria, Simis and Villarreal. They show that the ideal associated to a parametrized linear code is a Cohen-Macaulay, radical, lattice ideal of codimension 1. The interest in these ideals is twofold: on the one hand, they form a rich class of lattice ideals; on the other hand, their algebraic invariants, such as the Castelnuovo-Mumford regularity, play an important part in the computation of the basic parameters of the code. In this talk, we shall focus on the case when the code is parametrized by the edges of a graph. We will review the general theory of parametrized linear codes and present some recent results (in joint work with Vaz Pinto and Villarreal) concerning the generators of the vanishing ideal and its Castelnuovo-Mumford regularity.

16:30-17:15 Ilda Perez da Silva (CELC, UL)

Reconstruction problems for Matroids and Oriented Matroids

Abstract: We consider reconstruction problems of matroids and oriented matroids from partial lists of (co)circuits. We will focus on the results and discussion of some interesting examples concerning reconstruction from lists of small (3 and 4-element) circuits.