The 2nd Combinatorics Day

Saturday, 17th of March of 2012

DMUC, room 2.5

Abstracts

10:30-11:00 **Inês Legatheaux** (CELC, UL):

Annulment and equality of partially symmetrized decomposable tensors

Abstract: The notion of symmetry class of tensors is an important example of an application of the representation theory of the symmetric group whose study has provided many developments in combinatorics. Finding combinatorial conditions for a symmetrized decomposable tensor to be zero or for two symmetrized decomposable tensors to be equal are problems that have proved to be particularly fruitful over the past 40 years. In 2009, A. Berget approached these problems using an existing correspondence between the representation theory of the symmetric group and that of the general linear group over some complex tensor space. Known as Schur-Weyl duality, this classical correspondence provides a natural tool to obtain very short and elegant proofs of results involving symmetrized decomposable tensors. In this talk, we will present the rook monoid, an algebraic structure closely related to the symmetric group, and derive a general notion of partial symmetry class of tensors from its representation theory. Using A. Bergets approach with an analog of Schur-Weyl duality between the rook monoid and the general linear group over some complex tensor space (obtained by L. Solomon in 2002), we will provide necessary and sufficient conditions for the corresponding annulment and equality problems of partially symmetrized decomposable tensors, generalizing two well-known theorems of multilinear algebra.