Algebra and Geometry Seminar

Speaker: Rita Fioresi (University of Bologna)

Title: On generalized root systems.

Abstract: In this talk (joint work with I. Dimitrov, Queens U.) we introduce the category of generalized root systems. The notion of ordinary root systems is the key to understand Lie theory and its many generalizations (contragredient superalgebras, affine, Kac-Moody (super) algebras etc). However, such notion is "rigid", it does not behave reasonably under quotients and moreover lacks of a unified treatment, that is definitions and results are usually confined to the realm of application. The rigidity of ordinary root systems stems from their invariance under the action of the Weyl group. Once we abandon the notion of Weyl group as we know it, we can look for another definition of root systems that is able to take into account all examples mentioned above and more. For example, the systems stemming from the eigenspace decomposition with respect to a non maximal toral subalgebra (Kostant root systems). They play a key role in the classification of the complex structures on the symmetric space G/K, for K a non maximal torus. This is a generalization of the hermitian symmetric spaces theory. In this talk we give an effective way to compute bases for generalized root systems, which are quotients of Lie algebra ones and we classify all root systems of rank two up to combinatorial equivalence finding 16 such.