Algebra and Number Theory Seminar

Title: The Geometry of Special Lattices

Speaker: Madeeha Khalid (St. Patrick's College, Drumcondra, DCU)

Date: Mon 28th September 2009 at 4:00PM

Location: Mathematical Sciences Seminar Room

Abstract: We study the geometry of an interesting class of four dimensional spaces called K3 surfaces. These arise naturally in theoretical physics. Some K3 surfaces admit a particular Z/2Z action called an "anti symplectic involution," and from Nikulin's results it follows that the existence of these surfaces corresponds to the existence of special "2-elementary" lattices. Suppose L is a lattice and L^* its dual, then L is 2-elementary if L^*/L is a finite group consisting of elements of order 2. In general there is no way of determining explicit geometric realisations of these K3 surfaces from the lattices, and vice versa. We determine exact conditions on the lattices associated to some examples of K3 surfaces with anti symplectic involutions, including the Z/3Z and Z/4Z orbifold limits of K3 surfaces.

K3 surfaces with anti symplectic involutions also give rise to three dimensional Calabi-Yau manifolds. Our results are expected to lead to explicit constructions of conformal field theories on these Calabi-Yau manioflds.