



Algebra and Number Theory Seminar

Title: Bachet's Problem and its Generalizations

Speaker: Edwin O'Shea (UCC)

Date: Mon 8th November 2010 at 4:00PM

Location: Mathematical Sciences Seminar Room

Abstract: A problem that enjoys an enduring popularity asks: "what is the least number of pound weights that can be used on a scale pan to weigh any integral number of pounds from 1 to 40 inclusive, if the weights can be placed in either of the scale pans?" W.W. Rouse Ball attributes the first recording of this problem to Bachet in the early 17th century, calling it "Bachet's Weights Problem". However, Bachet's problem stretches all the way back to Fibonacci in 1202, making it a viable candidate for the first problem in the thoroughly modern active area of partitions of integers. By the way, the unique solution is given by the partition $40 = 1 + 3 + 9 + 27$. Remarkably, given the age of Bachet's problem, an elegant and succinct solution to this problem when we replace 40 with any integer has only come to light in the last 15 years: the partitions are understood in terms of lattice points in polyhedra and counted via ternary partitions. We hope to provide a survey of this and other generalizations of the problem, including one by MacMahon from the 19th century and current work on an "error correcting" generalization due to the speaker and Jorge Bruno.