

# MATHEMATICS RESEARCH SEMINAR

## Quadratic twists of an elliptic curve with small Selmer rank

**Speaker:** Sungkon Chang

**Date:** Monday, March 6, 2006

**Time:** 4:00 p.m.

**Where:** University Hall 106

**Abstract:**

An elliptic curve  $E$  is the complex solutions of a two-variable cubic equation:  $y^2 = x^3 + ax + b$ . For rational numbers  $a$  and  $b$ , finding the rational solutions of this equation, denoted by  $E(\mathbb{Q})$ , is a well-known unsolved problem in number theory. A quadratic twist of  $E$  is given by  $Dy^2 = x^3 + ax + b$  for a nonzero integer  $D$ , and denoted by  $E_D$ . The distribution of the “size” of the solution set  $E_D(\mathbb{Q})$ , as  $D$  varies, attracted many number theorists because of an interesting implication, on these quadratic twists, of the Birch and Swinnerton-Dyer Conjecture.

A Selmer group of an elliptic curve  $E$  is a certain computable group attached to  $E$ , from which we can obtain a good upper bound for the size of  $E(\mathbb{Q})$ . In the literature, it seems that little is known in general about the distribution of small Selmer ranks in the family of the quadratic twists  $E_D$ . In this talk, we present our result on finding an integer  $D$  such that  $E_D$  has small Selmer rank.