



## Algebra and Number Theory Seminar

**Title:** Folding, Tiling and Applications to Multidimensional Coding

**Speaker:** Prof Tuvi Etzion (Technion IIT)

**Date:** Tue 8th September 2009 at 11:00AM

**Location:** CASL Seminar Room - Belfield Office Park

**Abstract:** Folding a sequence  $S$  into a multidimensional box is a well-known method which is used as a multidimensional coding technique. The operation of folding is generalized in a way that the sequence  $S$  can be folded into various shapes and not just a box. The new de

inition of folding is based on lattice tiling and a direction in the  $D$ -dimensional grid. There are potentially  $(3^D - 1)/2$  different folding operations. Necessary and sufficient conditions that

ne a folding are derived. The immediate and most impressive application is some new lower bounds on the number of dots in two-dimensional synchronization patterns. This can be also generalized for multidimensional synchronization patterns. It is also shown how folding can be used to construct multidimensional error-correcting codes. Finally, multidimensional pseudo-random arrays with various shapes are generated.