THE WEIZMANN INSTITUTE OF SCIENCE  
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE  
Geometric Functional Analysis and Probability Seminar  
Room 290C ,Ziskind Building  
on Thursday, Feb 09, 2017  
at 11:15  
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Sydney  
The values of quadratic forms on difference sets, measure rigidity and equidistribution  
Abstract:  
Given a quadratic form $Q$ in $d$ variables over the integers, e.g. $Q(x,y,z) = xy - z^2$, and a set of positive density $E$ in $\mathbb{Z}^d$, we investigate what kind of structure can be found in the set $Q(E-E)$.  
We will see that if $d \geq 3$, and $Q$ is indefinite, then the measure rigidity, due to Bourgain-Furman-Lindenstrauss-Mozes or Benoist-Quint, of the action of the group of the symmetries of $Q$ implies that there exists $k \geq 1$ such that $k^2 Q(\mathbb{Z}^d)$ is a subset of $Q(E-E)$.  
We will give an alternative proof of the theorem for the case $Q(x,y,z) = xy - z^2$ that uses more classical equidistribution results of Vinogradov, and Weyl, as well as a more recent result by Frantzikinakis-Kra. The latter proof extends the theorem to other polynomials having a much smaller group of symmetries. Based on joint works with M. Bjorklund (Chalmers), and K. Bulinski (Sydney).