Speaker: Shai Evra

Title: Ramanujan complexes and golden gates in $PU(3)$

Abstract: In their seminal works from the 80's, Lubotzky, Phillips and Sarnak proved the following two results:

(i) *An explicit construction of Ramanujan regular graphs.*

(ii) *An efficient and easily applied method of placing points on the sphere uniformly equidistributed.*

These two seemingly unrelated problems, were solved by applying deep number theoretic Theorems (Deligne-Ramanujan conjecture, Jacobi Theorem) on a single group form of PGL_2 over the rational field.

In recent years these two results have seen the following generalizations and developments:

(i+) *The explicit construction of Ramanujan complexes by Lubotzky, Samuels and Vishne.*

(ii+) *The explicit construction of super golden gates for PU(2) by Parzanchevski and Sarnak.*

This time, the two results are unrelated, since the construction of LSV is over a field of positive characteristic and not over the rationals.

In this talk I will describe a recent new construction of both golden gates for PU(3) and an explicit construction of new Ramanujan complexes. Moreover, we shall see that these constructions are actually 'local' consequences coming from analyzing a single 'global' group (much like the LPS construction).

This is a joint work with Ori Parzanchevski.