Department of Mathematics, BGU

BGU Probability and Ergodic Theory (PET) seminar

On *Thursday, December ,19 2019*

At *11:10 – 12:00*

In *101-*

Rene Rühr (Technion)

will talk about

Cut-And-Project quasicrystals and their moduli spaces

Abstract: A cut-and-project set is constructed by restricting a lattice L in $(d+m)$-space to a domain bounded in the last m coordinates, and projecting these points to the the space spanned by its d-dimensional orthogonal complement. These point sets constitute an important example of so-called quasicrystals.

During the talk, we shall present and give some classfiication results of the moduli spaces of cut-and-project sets, which were introduced by Marklof-Strömbergsson. These are obtained by considering the orbit closure of the special linear group in d-space acting on the lattice L inside the space of unimodular lattices of rank $d + m$. Theorems of Ratner imply that these are meaningful objects.

We then describe quantitative counting result for patches in generic cut-and-project sets. Patches are local configuration of point sets whose multitude reflects aperiodicity.

The count follows some old argument of Schmidt using moment bounds. These bounds are obtained by integrability properties of the Siegel transform, which in turn follow from reduction theory and a symmetrisation argument of Rogers. This argument is of independent interest, giving an alternative account to recent work of Kelmer-Yu (which is based on the theory of Eisenstein series) on counting points in generic symplectic lattices.

This is a joint endeavour with Yotam Smilansky and Barak Weiss.