

Department of Mathematics, BGU

BGU Probability and Ergodic Theory (PET) seminar

On Thursday, January 5, 2023

At 11:10 – 12:00

In 101-

Yotam Smilansky (Rutgers University)

will talk about

Classification and statistics of cut-and-project sets

Abstract: Cut-and-project point sets are constructed by identifying a strip of a fixed n -dimensional lattice (the “cut”), and projecting the lattice points in that strip to a d -dimensional subspace (the “project”). Such sets have a rich history in the study of mathematical models of quasicrystals, and include well-known examples such as the Fibonacci chain and vertex sets of Penrose tilings. Dynamical results concerning the translation action on the hull of a cut-and-project set are known to shed light on certain properties of the point set itself, but what happens when instead of restricting to translations we consider all volume preserving linear actions?

A homogenous space of cut-and-project sets is defined by fixing a cut-and-project construction and varying the n -dimensional lattice according to an $SL(d, \mathbb{R})$ action. In the talk, which is based on joint work with René Rühr and Barak

Weiss, I will discuss this construction and introduce the class of Ratner-Marklof-Strömbergsson measures, which are probability measures supported on cut-and-project spaces that are invariant and ergodic for the group action. A classification of these measures is described in terms of data of algebraic groups, and is used to prove analogues of results about a Siegel summation formula and identities and bounds involving higher moments. These in turn imply results about asymptotics, with error estimates, of point-counting and patch-counting statistics for typical cut-and-project sets.