IMU 2021 Number Theory Session

14:00-14:40 Nadav Yesha (University of Haifa)

Title: **Poissonian statistics for sequences modulo one**

Abstract: A natural way to test for the randomness of a sequence of points in R/Z is to consider its local statistics such as the k-level correlations and the nearest-neighbour gap distribution, and compare them to those of a sequence of uniform independent random points (Poisson statistics). In this talk I will describe recent results concerning natural examples, including:

- The sequence $\{x^n\}$, where in a joint work with Aistleitner, Baker and Technau we showed that for almost all x>1, all the correlations and hence the normalized gaps have a Poissonian limit distribution.
- The sequence $\{n^x\}$, where in a joint work with Technau we showed Poissonian k-level correlations for almost all sufficiently large x (depending on k).

14:50-15:30 Daniel Disegni (Ben Gurion University)

Title: **Algebraic cycles and derivatives of p-adic L-functions for hermitian motives**

Abstract: I will talk about work in progress on the arithmetic of some higher-rank motives M. The goal is to show that if the p-adic L-function of M vanishes to order 1, then an explicit algebraic cycle gives a nontrivial class in the Bloch-Kato Selmer group of M. The motives are those attached to certain p-ordinary cuspidal automorphic representations of U(2n), and the statement is predicted by analogues of the Birch and Swinnerton-Dyer conjecture.

15:50-16:30 Amitay Kamber (University of Cambridge)

Title: **On Sarnak's density conjecture and its applications**

Abstract: Sarnak's Density Conjecture is an explicit bound on the multiplicities of non-tempered representations in a sequence of cocompact congruence arithmetic lattices in a semisimple Lie group, which based on the work of Sarnak and Xue. The conjecture can be regarded as an approximation to the Generalized Ramanujan Conjecture (GRC) in automorphic forms, but should also hold in far greater generality.
I plan to give a general discussion of the conjecture, the best current results towards its solution, and its relation to other problems.
The first relation is to the geometry of locally symmetric spaces, where, partially conjecturally, the conjecture is equivalent to a “weak injective radius property”.
The second relation is to the lifting of elements from varieties over finite fields to varieties over Z. For example, it predicts that almost every element of $SL_n(F_p)$ can be lifted to an element of $SL_n(Z)$, with the minimal possible bound on its norm.
Based on joint works with Konstantin Golubev and Hagai Lavner.

16:40-17:20 Ishai Dan-Cohen (Ben Gurion University)

Title: **Towards integral points via augmentation spaces**

Abstract: The Chabauty-Kim method uses obstructions coming from the pro-unipotent completion of the fundamental group of a variety over an arithmetic base to bound the set of integral (or rational) points. Kim has shown that various standard conjectures imply that the method can be used to bound the set of integral points of every hyperbolic curve; his conjecture asserts that the method can be used to compute the exact set of integral points. I'll report on ongoing work aimed at formulating a “delooped” version of Kim's theory. This version relies on invariants which lie closer to the integral points they attempt to classify. It can also be made motivic, with no need for a motivic t-structure.