Department of Mathematics, BGU

Colloquium

On *Tuesday, November ,18 2025*

At *14:30 – 15:30*

In *Math 101-*

Yeor Hafouta (University of Florida)

will talk about

Statistical properties of Markov shfits

Abstract: The central limit theorem (CLT) and related results for stationary weakly dependent sequences of random variables have been extensively studied in the past century, starting from a pioneering work of Berenstien .(1927) However, in many physical phenomena there are external forces, measurement errors and unknown variables (e.g. storms, the observer effect, the uncertainty principle etc.). This means that the local laws of physics depend on time, and it leads us to studying non-stationary sequences.

The asymptotic behaviour of non-stationary sequences have been studied extensively in the past decades, but it is still developing compared with the theory of stationary processes. In this talk we will focus on inhomogeneous Markov chains. For sufficiently well contracting Markov chains the CLT was first proven by Dobrushin .(1956) Since then many results were proven for stationary chains. In 2021 Dolgopyat and Sarig proved local central limit theorems (LCLT) for inhomogeneous Markov chains. In 2022 Dolgopyat and H proved optimal CLT rates

in Dobrusin's CLT. These results closed a big gap in literature concerning the non-stationary case.

An open problem raised by Dolgopyat and Sarig in their 2021 book concerns limit theorems for Markov shfits, that is when the underlying sequence of functions that forms the partial sums depend on the entire path of the chain. Two circumstances where such dependence arises are products of random matrices and random iterated functions, and there are many other instances when the functionals depend on the entire path.

In this talk we will present our solution to the above problem. More precisely, we prove CLT, optimal CLT rates and LCLT for a wide class of sufficiently well mixing Markov chains and functionals with infinite memory. Even though the inhomogeneous case is more complicated, our results seem to be new already for stationary chains.