Department of Mathematics, BGU

AGNT

On *Wednesday, April ,2 2025*

At *14:10 – 15:10*

In *101-*

Sa'ar Zehavi (Ben Gurion University)

will talk about

The Unipotent Chabauty–Kim–Kantor Method for Relative Completions

Abstract: The Effective Siegel Problem aims to explicitly construct, in finite computation, a complete list of integral points on a given affine hyperbolic curve. Recent advances on this problem include the groundbreaking methods of Chabauty–Kim and Lawrence–Venkatesh. Both approaches study the variation of Hodge structures on bundles associated with the hyperbolic curve of interest, yet each has distinct strengths and limitations. The Chabauty–Kim method, while conditioned on the Bloch–Kato conjecture, has successfully facilitated effective computation of integral points on various curves. Conversely, the Lawrence–Venkatesh method is unconditional but has not yet been practically applied to compute integral points for any specfiic curve. Kantor's thesis was a promising initial effort toward bridging these two methods, aiming to combine their strengths through the theory of relative completions. In joint work with David Corwin, titled "The Unipotent Chabauty–Kim–Kantor Method for

Relative Completions," we present the first genuine synthesis of these powerful methods.

In this talk, we will briefly review previous developments to highlight our contribution as a natural progression toward a unfiied framework. We will introduce the concept of relative completions, outline Kantor's initial approach, and then discuss our variant method, which resolves several key limitations identfiied in Kantor's work. Our main result reduces the problem of Diophantine finiteness to a dimension inequality involving a pair of algebraic spaces—one arithmetic and the other geometric. If time permits, we will derive this dimension inequality explicitly for modular curves under the Bloch–Kato conjecture.