Speaker: Anush Tserunyan

Title: Multiple recurrence, filters, and a Ramsey theorem

Abstract: A major theme in ergodic Ramsey theory is proving multiple recurrence results for certain one-recurrent (mixing) actions of semigroups. The amplification of one-recurrence to multiple is usually done using a so-called van der Corput difference lemma for a suitable filter on the semigroup. Particular instances of this lemma (for concrete filters) have been proven before (by Furstenberg, Bergelson--McCutcheon, and others), with a different proof for each filter. We define a notion of differentiation for subsets of semigroups and isolate the class of filters that respect this notion. The filters in this class (call them Delta-filters) include all of those for which the van der Corput lemma was known, and our main result about them is a Ramsey theorem related to labeling edges between the semigroup elements with their ratios. An application of this theorem yields a van der Corput lemma for Delta-filters, generalizing all its previous instances.