

Abstracts: Groups, Property (T), and Expansion I

Lodha Mathematical Sciences Institute

Name: Christophe Pittet and Indira Chatterji

Title: The rapid decay property

Part I and II (Pittet): Heat kernels and the rapid decay property

Abstract: Property RD (rapid decay) says that the matrix coefficients of a unitary representation of a locally compact group decay fast with respect to a length function. We will explain some relations of property RD with the Harish-Chandra function of a semisimple group.

Part III, IV and V (Chatterji): Rapid decay, median geometry and beyond.

Abstract: I will discuss some applications of the rapid decay property (Baum-Connes conjecture). I will also discuss roughly median geometry, which is the geometry of a product of rank one Lie groups, and a class of groups that have rapid decay property. I will also discuss the problems that arise in higher rank.

Name: Mitul Islam and Ralph Spatzier

Title: Recent Developments in the Zimmer Program

Part I&II (Islam): Boundary actions of lattices and rigidity

Abstract: A lattice in a higher rank Lie group G (e.g. $SL(n, \mathbb{R})$ for n at least 3) acts naturally on several compact G -homogeneous spaces: the so-called Furstenberg boundaries of the G -symmetric space. I will discuss the question of what happens to these natural actions under small perturbations.

There are several classical theorems establishing that such actions are “stable” under perturbations in G as well as via smooth diffeomorphisms. However the case of continuous deformations - bereft of any regularity - had been elusive. I will discuss my joint work with Connell, Nguyen, and Spatzier establishing a rigidity result in this continuous case. We also show that this rigidity vanishes in the visual boundary action.

Part III & IV (Spatzier): On Hyperbolic Actions of Higher Rank Semisimple Lie groups. These lectures describe recent work with Danijela Damjanovic, Kurt Vinhage and Disheng Xu.

Part III: Background and Statement of Results

This talk will introduce the dynamical notions and ideas that allows to formulate our result such as Anosov actions, partially hyperbolic actions, accessibility, bi-homogeneous actions

We will exhibit examples such actions. Our main result classifies such actions up to smooth conjugacy as bi-homogeneous actions.

Part IV: Main Ideas in the proofs

I will discuss the main steps in the proof of our classification theorems - and in particular, how to take brackets of Hoelder vector fields.

Name: Tullia Dymarz

Title: Quasi-isometric rigidity

Abstract: Finitely generated groups can be treated as metric spaces when assigned a word metric. However, these metrics depend on picking a generating set and so we usually consider these groups up to quasi-isometric equivalence. Quasi-isometric rigidity involves finding classes of groups that are closed under this equivalence. In these talks we will explore the basics of quasi-isometric rigidity with a focus on the Eskin-Fisher-Whyte program of understanding quasi-isometries of lattices in solvable Lie groups but other groups and techniques will be surveyed as well.

Name: Ignacio Vergara

Title: Property (T) for uniformly bounded representations

Abstract: Kazhdan's property (T) is defined as a rigidity property of unitary representations of groups. In these talks, I will focus on a strengthening of this property for uniformly bounded representations. Special attention will be given to the characterisation of property (T) in terms of Kazhdan projections and invariant means. I will also explain how these ideas extend to the setting of relative property (T) for pairs of groups.

Name: Inheyok Choi

Title: Animations on hyperbolicity

Abstract: We will play with inhyeokchoi48.github.io/research/binary . If time allows, we will move on to inhyeokchoi48.github.io/research/poincare . If time still permits, I will explain some maths behind it. Based on joint work with Donggyun Seo.