Mini-workshop On Topological Dynamical Systems

Time: October 9, 2023

Venue: Shanghai Center for Mathematical Sciences, Fudan University (Jiangwan Campus)

Organizers: Weixiao Shen (Fudan University), Guohua Zhang (Fudan University)

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Physical measures for a class of partially hyperbolic attractors

Yongluo Cao
(Soochow University, China)

In this talk, we consider the existence of SRB measure for partially hyperbolic attractors. If the systems's central direction can be decomposed into one dimension sub-bundles which are dominated splitting, and all u-gibbs measures are hyperbolic, then there exist finite physical measures.

Polynomial Furstenberg joinings and its applications

Song Shao
(University of Science and Technology of China, China)

In this talk, a polynomial version of Furstenberg joining is introduced and its structure is investigated. Particularly, it is shown that if all polynomials are non-linear, then almost every ergodic component of the joining is a direct product of an infinity-step pro-nilsystem and a Bernoulli system. Also we will give some applications of our work. *The talk is based on the joint works with Wen huang and Xiangdong Ye.*

Lifting generic points

Tomasz Downarowicz
(Wroclaw University of Science and Technology, Poland)

Let (X, T) and (Y, S) be two topological dynamical systems, where (X, T) has the weak specification property. Let \xi be an invariant measure on the product system (XxY, TxS) with marginals \mu on X and \nu on Y, with \mu ergodic. Let y be a point in Y quasi-generic for \nu. Then there exists a point x in X generic for \mu such that the pair (x, y) is quasi-generic for \xi. This is a generalization of a similar theorem by T. Kamae, in which both (X, T) and (Y, S) are full shifts on finite alphabets. *This is a joint work with Benjy Weiss.*

Multiplicity of topological systems

Ruxi Shi
(Sorbonne University, France)

For a topological dynamical system, we introduce the concept of topological multiplicity. In this talk, I will present its definition and several properties of topological systems with finite multiplicity. I will also discuss several examples to illustrate this concept. If time permits, I will talk about the multiplicity of subshifts with linear growth complexity. Some open problems related to this topic will be discussed during the talk. *This is a joint work with David Burguet.*

Asymptotic pairs in topological actions of countable amenable groups

Mateusz Więcek
(Wroclaw University of Science and Technology, Poland)

For classical dynamical systems there is known a characterization of zero-entropy topological $\mathbb{Z}$-actions as factors of systems with no asymptotic pairs. In the talk we present a similar characterization obtained for topological actions of countable amenable groups with aid of recently developed theory of multiorders. We prove a theorem stating that if G is a countable amenable group and (X, G) is a topological G-action of positive entropy, then for every multiorder (\tilde{$\mathcal{O}$}, \nu, G) and \nu-almost every order $\prec$ in \tilde{$\mathcal{O}$} there exists a pair which is $\prec$-asymptotic (asymptotic with respect to this order). We will also show that for every countable amenable group G, and every multiorder on G arising from a tiling system, every topological G-action of entropy zero has an extension with no $\prec$-asymptotic pairs for any $\prec$ belonging to this multiorder. Therefore, we have the following characterization of topological G-actions of entropy zero: (X, G) has topological entropy zero if and only if there exists a multiorder (\tilde{$\mathcal{O}$}, \nu, G) on G and an extension (Y, G) of (X, G), such that for \nu-almost any $\prec$ in \tilde{$\mathcal{O}$}, there are no $\prec$-asymptotic pairs in (Y, G). *This is a joint work with Tomasz Downarowicz.*