南開大學
Nankai University

南开逻辑研讨会

会议手册

南开大学数学科学学院

2024 年 12 月 13–15 日

会议日程表

Beijing Time		Chair	Room	Title
12月14日AM	9:00-9:45	丁龙云	第一报告厅	杨跃: Halpern-Läuchli Theorem and Reverse Mathematics
	9:45-10:05	Break		
	10:05-10:50	丁龙云	第一报告厅	郑阳: The equivalence relations E(G)
	10:50-11:10	Break		
	11:10-11:55	丁龙云	第一报告厅	黄书棋: Asymtotic representations of topological semigroups and stable finiteness
Lunch				
12月14日PM	14:00-14:45	高速	第一报告厅	吴刘臻: Forcing construction related to club principle
	14:45-15:05	Break		
	15:05-15:50	高速	第一报告厅	肖鸣: Borel 序维度
	15:50-16:10	Break		
	16:10-16:55	高速	第一报告厅	王天浩: Continuous Edge Chromatic Numbers of Abelian Group Actions
Dinner				

Beijing Time		Chair	Room	Title
12月15日AM	9:00-9:45	杨跃	第一报告厅	何家亮: The complexity of classifying continuous t-norms up to isomorphism
	9:45-10:05	Break		
	10:05-10:50	杨跃	第一报告厅	Víctor Hugo Yañez: Topological simplicity in minimally almost periodic free groups
	10:50-11:10	Break		
	11:10-11:55	杨跃	第一报告厅	彭程: Isolated d.c.e. degrees and Σ_1 induction
Lunch				

Halpern-Läuchli Theorem and Reverse Mathematics

杨跃
新加坡国立大学

Abstract:

Let T denote the full binary tree. For each $n \geq 1$, let $T(n)$ be the set of level n nodes in T. An subtree $S \subseteq T$ is said to be *strong* if (i) for all m, $S(m) \subseteq T(n)$ for some $n \geq m$, and (ii) if $\sigma \in S(m)$ then every immediate successor of σ in T has one and exactly one extension in $S(m+1)$. The Halpern-Läuchli Theorem (denoted HL) states that for all $d, k \geq 1$, for all

$$f : \bigcup_n \prod_{i \leq d-1} T_i(n) \to k,$$

there exist strong subtrees $S_i \subseteq T_i$ such that $f \restriction \bigcup_n \prod_{i \leq d-1} S_i(n)$ is a constant. This combinatorial theorem was introduced in 1966 to solve set-theoretical problems. Recently it has been studied by logicians who are interested in both infinite combinatorics and in reverse mathematics. It is known that with sufficient induction, Halpern-Läuchli Theorem holds recursively, that is, the homogeneous strong subtrees can be computed recursively from the coloring f. However, we will demonstrate that without Σ_2-induction, the picture is different. Moreover, We show that over the base system $\mathsf{RCA}_0 + \Sigma^0_2$-bounding, $\mathsf{RCA}_0 + \mathsf{HL}$ does not imply Σ^0_2-induction.

This talk is based on an ongoing joint project with Chitat Chong, Wei Li from National University of Singapore and Lu Liu from Central South University, China.

The equivalence relations E(G)

郑阳
中国科学院数学与系统科学研究院

Abstract: We introduce a kind of orbit equivalence relations $E(G)$ which can well describe structures and properties of Polish groups from the perspective of Borel reducibility. First, we review the basic concepts of Borel reduction. Then, we present some general results on $E(G)$, including Rigid theorems on TSI Polish groups.

Asymtotic representations of topological semigroups and stable finiteness

黄书棋
福州大学

Abstract: Hyperlinear and sofic groups are two classes of discrete groups come from different corners of mathematics (operator algebras and symbolic dynamics, respectively), and can be characterized as subgroups of metric ultraproducts of families of, respectively, unitary groups and finite symmetric groups. Hyperlinear groups come from the Connes' embedding conjecture (1976), while sofic groups, introduced by Gromov, are motivated by a problem of symbolic dynamics: Gottschalk' s surjunctivity conjecture (1973). In 1969, Kaplansky proved that every group algebra over a field of characteristic 0 is stable finiteness and he propose an open problem: Is every group algebra always stable finiteness? In 2002, Ara, O' Meara and Perera settled the Kaplansky' s conjecture for residually amenable groups, and in 2004, Elek and Szabo settled this conjecture for sofic groups. In fact, hyperlinear and sofic groups also can be

described by their asymtotic representations. In this talk, I will give an introductory survey of continuously asymtotic representations of general topological semigroups, and using a different approach, I will introduce a new proof of the stable finiteness for sofic groups.

Forcing construction related to club principle

吴刘臻
中国科学院数学与系统科学研究院

Abstract: Club principle is a weak form of diamond principle. Shelah first introduce a forcing poset seperating club and diamond. Similar forcing posets were also introduced later. In a ongoing project, we introduce a new forcing poset seperating club and diamond and discuss its possible application.

Borel 序维度

肖鸣
南开大学

Abstract: 我们将介绍关于有向图的 dichromatic number 与序维度之间的关系，并讨论其 Borel 组合学。对不可数的 Borel dichromatic number 我们将给出一个二分性定理，并由其导出不可数 Borel 序维度的二分定理。最后，我们观察关于 Borel 序维度的可能取值的一些独立性结果。这是一项与 Dilip Raghavan 的合作工作。

Continuous Edge Chromatic Numbers of Abelian Group Actions

王天浩
南开大学

Abstract: We prove that for any generating set S of $\Gamma = \mathbb{Z}^n$, the continuous edge chromatic number of the Schreier graph of the Bernoulli shift action $G = F(S, 2^\Gamma)$ is $\chi'_c(G) = \chi'(G) + 1$. In particular, for the standard generating set, the continuous edge chromatic number of $F(2^{\mathbb{Z}^n})$ is $2n + 1$.

The complexity of classifying continuous t-norms up to isomorphism

何家亮
四川大学

Abstract: It is shown that the isomorphism relation between continuous t-norms is Borel bireducible with the relation of order isomorphism between linear orders on the set of natural numbers, and therefore, it is Borel bireducible with every Borel complete equivalence relation.

Topological simplicity in minimally almost periodic free groups

Víctor Hugo Yañez
南开大学

Abstract: All topological spaces considered in this talk shall be assumed Hausdorff.

A topological group is said to be *minimally almost periodic* (MinAP) if it admits no non-trivial continuous homomorphism to a compact group. This notion was introduced by von Neumann in the 1930's in connection to the works of Bohr related to the (real-valued) almost periodic functions appearing in the context of Harmonic Analysis. In the modern theory of topological dynamics, the MinAP groups regularly appear as a consequence of extreme amenability.

In this talk we present a proof of the following result: a free group F of countably infinite many generators admits a metric group topology $\mathcal{T}$ making it topologically simple, and which satisfies the following property: for each open neighbourhood U of the identity, F can be represented as the subgroup generated by the subgroups of F contained in U (the so-called *algebraic small subgroup generating property*). This implies that $(F, \mathcal{T})$ admits no non-trivial homomorphism to neither NSS nor locally compact groups (in particular, implying that F is minimally almost periodic).

Isolated d.c.e. degrees and Σ_1 induction

彭程
河北工业大学

Abstract: A d.c.e. degree d is called isolated (resp. upper isolated) if there is a c.e. degree $a < d$ (resp. $a > d$) such that there are no c.e. degrees strictly between a and d. In this talk, we focus on the inductive strength of both isolated and upper isolated d.c.e. degrees from the point of view of reverse recursion theory. We show that (1) $P^- + B\Sigma_1 + \mathrm{Exp} \vdash I\Sigma_1 \leftrightarrow$ There is an isolated d.c.e. degree below $\mathbf{0}'$; (2) $P^- + B\Sigma_1 + \mathrm{Exp} \vdash I\Sigma_1 \leftrightarrow$ There is an upper isolated d.c.e. degree below $\mathbf{0}'$. This is a joint work with Liu Yiqun and Liu Yong.