

# 逻辑学专题研讨会

时间：2022年8月8-9日

地点：哈尔滨工业大学一校区明德楼B区201-1学术报告厅

与会专家：(按姓名首字母排序)

丁龙云 南开大学

丁一峰 北京大学

冯琦 清华大学

高速 南开大学

郝兆宽 复旦大学

何家亮 四川大学

刘路 中南大学

彭银河 中国科学院数学与系统科学研究院

David Schrittester 多伦多大学

申国桢 武汉大学

宋诗畅 北京交通大学

吴刘臻 中国科学院数学与系统科学研究院

肖鸣 南开大学

尹志 安徽工程大学

喻良 南京大学

朱慧灵 暨南大学

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# 会议日程

8月8日 上午

08:30-08:45	欢迎致辞 (许全华, 高速)	
主持人: 冯琦		
08:50-09:30	丁龙云	On equivalence relations induced by Polish groups
09:35-10:15	彭银河	L field and L topological vector space
主持人: 喻良		
10:45-11:25	高 速	Countable Borel Equivalence Relations and Forcing
11:30-12:10	吴刘臻	Continuum function and strongly compact cardinal

8月8日 下午

主持人: 郝兆宽		
14:00-14:40	喻良	Some more results on relativized Chaitin's $\Omega$ .
14:45-15:25	刘路	Proof strength of variable word theorems
主持人: 端木昊随		
15:50-16:30	David Schritterser	Nonstandard analysis and statistical decision theory
16:35-17:15	宋诗畅	Applications of nonstandard analysis to graphon theory

8月9日 上午

主持人: 丁龙云		
08:45-09:25	冯琦	待定
09:30-10:10	申国桢	A surjection from square onto power
10:30-11:10	何家亮	Structure of summable tall ideal under Katetov order

# 报告题目与摘要

## **On equivalence relations induced by Polish groups**

丁龙云

南开大学

In this talk, we introduce a kind of orbit equivalence relations which can well describe structures and properties of Polish groups from the perspective of Borel reducibility. Given a Polish group  $G$ , let  $E(G)$  be the right coset equivalence relation. We investigate the complexity of  $E(G)$  for various Polish groups  $G$ . This is a joint work with Yang Zheng.

## **Countable Borel Equivalence Relations and Forcing**

高速

南开大学

I will talk about some results about countable Borel equivalence relations that can be proved with forcing constructions and arguments. These results reveal hidden regularity properties of Borel complete sections on certain orbits. As consequences they imply the nonexistence of Borel complete sections with certain features. This is joint work with Steve Jackson, Ed Krohne, and Brandon Seward.

## **Structure of summable tall ideal under Katetov order**

何家亮

四川大学

In this talk, we present some global structure of structure of summable tall ideal under Katetov order. We show that the Katetov order is the same as Rudin-Blass order on summable tall ideals. Also, we study the structure of summable tall ideal under Katetov order by Galois-Tukey concetions.

## **Proof strength of variable word theorems**

刘路

中南大学

The Hales-Jewett theorem asserts that every coloring of string space admits a combinatorial subspace (a set generated by a variable word). We study the proof strength of various such variable word theorems. We show that ordered variable word theorem is provable in Arithmetic Comprehension. We show, whether (non ordered) variable word theorem is provable in Recursion Comprehension (a question of Joe Miller and Solomon), is equivalent to a purely combinatorial question. Partly joint work with D' Auriac, Mignoty and Patey.

## **L field and L topological vector space**

彭银河

中国科学院数学与系统科学研究院

A topological space is Lindelof if every open cover has a countable subcover. A topological space is hereditarily Lindelof if every subspace is Lindelof. An L space is a space that is hereditarily Lindelof (HL) but not separable. A topological field is a field equipped with a topology such that all field operations are continuous functions. A topological vector space is a vector space equipped with a topology such that the operations of vector addition and scalar multiplication are continuous. We construct in ZFC an L field --- a topological field that is an L space --- and an L topological vector space --- a topological vector space that is an L space. This is a joint work with Liuzhen Wu.

## **Nonstandard analysis and statistical decision theory**

**David Schritterser**

多伦多大学

Statistical decision theory takes inspiration from game theory to provide a basic framework in which one can reason about optimality (or lack thereof) of statistical procedures, such as estimators and tests.

One property of a statistical procedure is which is certainly a necessary condition for optimality is that the procedure be "admissible": Roughly, an estimator is admissible if there is no other which does better under all circumstances (in a sense specified by the decision theoretical framework).

Admissibility is notoriously hard to characterize, and establishing a characterization in Bayesian terms has been an ongoing pursuit for decades in statistical decision theory. Recently we have found a characterization of admissibility (in a large class of statistical problems) in Bayesian terms, by using prior probability distributions which can take on infinitesimal values. We are also able to draw connections to classical methods establishing admissibility, such as Blyth's method and Stein's characterization of admissibility (which does partially characterize admissibility, but only under very technical hypotheses). Finally, our method has applications in concrete problems such as establishing the admissibility of the Graybill-Deal estimator.

## **A surjection from square onto power**

申国桢

武汉大学

In this talk, we prove that the existence of an infinite set  $A$  such that  $A^2$  maps onto  $2^A$  is consistent with ZF. This solves a long time open question proposed by John Truss. This is joint work with Yinhe Peng and Liuzhen Wu.

## **Applications of nonstandard analysis to graphon theory**

宋诗畅

北京交通大学

In 2006, Lovász and Szegedy introduced the notion of graphon. A graphon could be considered as a limit of a sequence of finite graphs. However, a graphon is not a graph but a symmetric measurable function from  $[0,1]^2$  to  $[0,1]$ . In this talk, we use methods from nonstandard analysis to present a new construction of graphons by taking a hyperfinite set  $H$ . An internal graph on  $H$  is a graph whose edge set is an internal subset of  $H \times H$ . We will build a correspondence between hyperfinite internal graphs and graphons. Graphons are not graphs, but internal graphs on  $H$  are indeed graphs.

## **Continuum function and strongly compact cardinal**

吴刘臻

中国科学院数学与系统科学研究院

The continuum function is a key and long-studied object inside set theory. We will survey the study on the behavior of continuum function in presence of strongly compact cardinals. We will also introduce some major research problems in this area. Finally, We discuss our recent work on forcing continuum function of some special pattern.

## **Some more results on relativized Chaitin's $\Omega$ .**

喻良

南京大学

We prove that, assuming ZF and restricted to any pointed set  $P$ , Chaitin's  $\Omega_U$  is not injective for any universal prefix-free Turing machine  $U$ , and that  $\Omega_U^x$  fails to be degree invariant in a very strong sense, answering several recent questions in descriptive set theory.