Tutorial Abstracts

Students' Talk's Abstracts

Abstracts are updated as of 8 July 2025

Anand Pillay
University of Notre Dame, USA

Binding groups (Definable Automorphism Groups) in Model Theory

I will give an exposition of the general theory of "internality" and "binding groups", focusing on the case of totally transcendental (omega-stable in the countable case) theories, together with applications.

Here is a rough plan (which may change a bit)
Lecture 1 will cover aspects of model theory beyond the basic material, including indiscernibles, aspects of definability, imaginaries and their elimination.
Lecture 2 will be about totally transcendental theories (stability, Morley rank, prime models, definable groups).
Lecture 3 will give a new account of internality and definable automorphism groups, emphasizing its "bitorsorial" nature.
Lecture 4 will be about some applications (to for example the fine structure of aleph-categorical theories).
Lecture 5 will consider the case of differential Galois theory with applications to functional transcendence.

References, reading materials. For basic material, which will be only briefly recalled in the first lecture see the attachment, lecture notes from a basic course at Notre Dame, model theory Math 60510.
For Lecture 1, see the Preliminaries section 1.1 of (Chapter 1) of my new book Topics in Model Theory, World Scientific, 2024.
For Lecture 2, one could also look at lecturenotes.stability.pdf which also includes Lecture 1 material.
I may give more references for Lectures 3,4,5 during the talks.

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Theodore Slaman
University of California at Berkeley, USA

Recursion Theoretic Methods within the Arithmetic Hierarchy and an Application within Geometric Measure Theory

We will develop some of the chief tools in recursion theory while focusing on properties of the Turing jump and the arithmetic hierarchy. We will then give an application to settle a question of C. A. Rogers (1962). This leads naturally to a line of investigation into the geometric properties of the Borel Hierarchy.

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W Hugh Woodin
Harvard University, USA

Exotic models

We will begin by surveying the relevant preliminary material on inner models with the approximation and cover properties, and the connection with the consistency problems related to the forcing axiom, Martin's Maximum.

We then will discuss a recent result that shows one can obtain an exotic model of Martin's Maximum, by starting with a ground model in which certain very large cardinals exist (and which are so large that they are incompatible with the Axiom of Choice).
The resulting model exhibits features which do not hold in any of the previously known models of Martin's Maximum.

We will also cover how large cardinals in the context of ZF (without assuming the Axiom of Choice) resolve certain key issues with the method of iterated forcing.

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Benjamin Koch
Swansea University, UK

Introduction to Effective Fractal Dimension

The purpose of this talk is to give an overview of effective fractal dimension, which is an application of computability theory to geometric measure theory. We will start with an overview of two of the most important notions of dimension in classical measure theory, the Hausdorff and packing dimensions. Following this will be the formulation of so-called effective dimensions for points in R^n via Kolmogorov complexity. The highlight of the study of effective dimension thusfar has been the "point-to-set principle", which connects the effective dimension of points in R^n to the classical dimension of the subsets in which they reside. We will discuss a handful of the results that have come from this connection, which include an alternate proof of the Kakeya conjecture in R^2, an improved lower bound on the Hausdorff dimension of Furstenberg sets (which generalize Kakeya sets in R^2), and a generalization of an upper bound on the Hausdorff dimension of intersections and products of subsets of R^n.

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Olaf Kolodziejski
Institute of Mathematics of the Polish Academy of Sciences, Poland

Cof Theta of uB under PFA

We will show that assuming class of Woodin cardinals proper forcing does not add a new uB set. We will then use this to show that assuming super compact cardinal and a class of Woodin cardinals that the usual iteration to force PFA force that cof Theta is omega1, showing that PFA+cof Theta is omega1 is consistent.

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Jacob Kowalczyk
University of Florida, USA

Ultraproducts of Finite Sets in ZF + DC

We show that it is consistent with ZF + DC that for some ultrafilter U on ω, two infinite ultraproducts of finite sets $\prod a_n/U$ and $\prod b_n/U$ have the same cardinality if and only if $0 < \lim_U |a_n|/|b_n| < \infty$. In particular, this holds in $W[U]$, where W is the Solovay model and U is $[\omega]^\omega$-generic.

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Yuxuan Li
Fudan University, China

A Variant of Chaitin's Ω Function

In this paper, we prove the continuous function *f* defined $x \mapsto \sum_{\sigma <_L x} 2^{-K(\sigma)}$ is differentiable precisely at density random points. We then establish algorithmic properties of *f*: *f(x)* is *x*-random if *x* is weakly low for K; *f*[$2^{\mathbb{N}}$] forms a Δ^0_2 class with Hausdorff dimension 1; and *f* is not Turing invariant. Finally, we introduce an effective null *Gδ* test where Σ^0_1 sets are replaced by unions of left-c.e. intervals.

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Yiping Miao
University of California, Berkeley, USA

Dimensions of Generic Reals

The set of (Cohen) generics is large in the sense of category, but small in measure. We'll show an exact characterization of how small it is in the sense of a refined notion of Hausdorff dimensions. The pattern suggests a possible connection between how the generic reals behave and how large the set could be.

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Uldana Ostemirova
Kazakh-British Technical University, Kazakhstan

On the Partially Classifiable Ceers

We are interested in computable reducibility of computably enumerable equivalence relations (abbreviated as ceers) on the set of natural numbers ω as introduced by Ershov. We say that equivalence relation R is computably reducible (notation: $R \leqslant S$) to equivalence relation S if there exists a computable total function f such that:
x R y if and only if f(x) S f(y), for all x, y in ω.

For a given partial computable function φ, let P_φ be the ceer defined in the following way:
x P_φ y if and only if (x = y or φ(x) converges and equals φ(y) converges).

Gao and Gerdes define PC to be the class of all ceers of the form P_φ. Define H to be the equivalence relation defined by:
x H y if and only if (x = y or φ_x(x) converges and equals φ_y(y) converges).

It is immediate from the definition that H is in PC. Gao and Gerdes showed that every PC equivalence relation reduces to H. Also, let H_1 be the relation defined by:
x H_1 y if and only if (x = y or φ_x(y) converges and equals φ_y(x) converges).
It is easy to see that $H \leqslant H_1$.

Theorem.If E is any c.e., reflexive, and symmetric binary relation on ω, then $E \leqslant H_1$. In particular, there are ceers E such that $E \leqslant H_1$ and $E \nleqslant H$.

Theorem.There are ceers $S \equiv H$ which are not in PC. For example, this is true of the equivalence relation S defined by:
⟨i, j⟩ S ⟨k, l⟩ if and only if i H k.

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Fariza Rakymzhankyzy
Kazakh-British Technical University, Kazakhstan

Generalized Computable Numberings

I will talk about the notion of a computable numbering of different families relative to an arbitrary oracle. The questions concern primarily universal computable numbering, Friedberg numbering and minimal cover.

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