2013 Workshop on Metamathematics and Metaphysics

Logic group at Fudan

Department of Philosophy, Fudan University

9:40 - 10:30

A multiverse perspective in mathematics and set theory: does every mathematical statement have a definite truth value?

Joel D. Hamkins

City University of New York — College of Staten Island, Graduate Center of CUNY

Much of the debate on pluralism in the philosophy of set theory turns on the question of whether every mathematical and set-theoretic assertion has a definite truth value. A traditional Platonist view in set theory, which I call the universe view, holds that there is an absolute background concept of set and a corresponding absolute background set-theoretic universe in which every set-theoretic assertion has a final, definitive truth value. I shall try to tease apart two often-blurred aspects of this perspective, namely, to separate the claim that the set-theoretic universe has a real mathematical existence from the claim that it is unique. A competing view, the multiverse view, accepts the former claim and rejects the latter, by holding that there are many distinct concepts of set, each instantiated in a corresponding set-theoretic universe, and a corresponding pluralism of set-theoretic truths. After framing the dispute, I shall argue that the multiverse position explains our experience with the enormous diversity of set-theoretic possibility, a phenomenon that is one of the central set-theoretic discoveries of the past fifty years and one which challenges the universe view. In particular, I shall argue that the continuum hypothesis is settled on the multiverse view by our extensive knowledge about how it behaves in the multiverse, and as a result it can no longer be settled in the manner formerly hoped for.

10:40 - 11:30

A survey on the Borelness of the intersection operation

Longyun Ding

Nankai University — Department of Mathematics

For a Polish space X, let $F(X)$ denote the space of all closed subsets of X with the Effros Borel structure, i.e., the Borel structure generated by the sets of form $\{F \in F(X) : F \cap U \neq \emptyset\}$, where U is an open subset of X. It is well known that the intersection operation $(A, B) \mapsto A \cap B$ from $F(X) \times F(X) \to F(X)$ is not necessarily Borel. We will give a survey on the Borelness of the intersection operation on some subclasses of $F(X)$, especially the case of X is a separable Banach space.

11:30 - 12:20

Embeddings of $P(\omega)/\mathrm{Fin}$ into Equivalence Relations between ℓ_p and ℓ_q

Zhi Yin

Nankai University — Department of Mathematics

Let $f : [0, 1] \to \mathbb{R}^+$ be an arbitrary function, we consider the relation $\mathbf{E}_f$ on $[0, 1]^\omega$ defined by setting, for every $x, y \in [0, 1]^\omega$, $(x, y) \in \mathbf{E}_f \Leftrightarrow \sum_{n<\omega} f(|y(n) - x(n)|) < \infty$. We show that the partial order structure $(P(\omega)/\mathrm{Fin}, \subseteq)$ can be embedded into $\mathbf{E}_f$'s. Using this result, we show that for all $1 \leq p < q < \infty$, $(P(\omega)/\mathrm{Fin}, \subseteq)$ can be embedded into the equivalence relations between ℓ_p equivalence relation and ℓ_q equivalence relation, which implies that there is continuum many Borel incomparable equivalence relations between ℓ_p equivalence relation and ℓ_q equivalence relation.

13:30 - 14:20

On strong Π^1_1-Martin-Löf randomness

Liang Yu

Nanjing University — Institute of Mathematical Science

We investigate the property of strong Π^1_1-Martin-Löf randomness. The randomness notion is an analog of weak-2-randomness in the classical setting. But the technique used to study in the higher randomness notion is quite different due to the fact that some "time sensitive" coding argument does not work in the higher setting.

14:20 - 15:10

Some metamathematics of Ramsey theory

Wei Wang

Sun Yat-sen University — Institute of Logic and Cognition

In reverse mathematics of Ramsey theory, Ramsey's theorem for pairs (RT^2_2) has been intensively studied and consequences of RT^2_2 compose a complicated picture strictly below the Arithmetic Comprehension Axiom (ACA). We will move from RT^2_2 to a different direction, to analyze consequences of RT^n_2 for $n > 2$. By a theorem of Jockusch, RT^3_2 is equivalent to ACA. However, it turns out that many consequences of RT^n_2 are strictly weaker than ACA. Among these weak consequences, some give rise to a finite hierarchy, which might be the initial segment of an infinite hierarchy.

15:20 - 16:10

Panel Discussion

June 15, 2013

Room 2401, West Guanghua Tower