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- Title: Beyond  $\Sigma_1^2$  absoluteness
- Abstract: Assuming there exists a proper class of measurable Woodin cardinals then  $\Sigma_1^2$  sentences are absolute between generic extensions of  $V$  satisfying CH.

A sentence is  $\Sigma_2^2(\mathcal{I}_{\text{NS}})$  if it is logically equivalent (over ZFC) to the assertion that

$$\langle H(c^+), \mathcal{I}_{\text{NS}}, \epsilon \rangle \models \phi$$

for some  $\Sigma_2$  sentence  $\phi$ . Here  $\mathcal{I}_{\text{NS}}$  denotes the nonstationary ideal on  $\omega_1$ . Thus  $\Sigma_2^2(\mathcal{I}_{\text{NS}})$  sentences are at worst  $\Sigma_3^2$ .

The  $\Omega$  Conjecture implies that  $\Sigma_2^2(\mathcal{I}_{\text{NS}})$  absoluteness fails conditioned on *any*  $\Sigma_2$  sentence. This leaves open the case of  $\Sigma_2^2$  absoluteness.

If  $M$  is an iterable Mitchell-Steel model in which there is a proper class of Woodin cardinals then necessarily  $\Sigma_2^2$  absoluteness fails in  $M$  conditioned on any  $\Sigma_2$  sentence which can hold in a generic extension of  $M$ . This strongly suggests that no large cardinal hypothesis below that of superstrong can suffice to prove conditional  $\Sigma_2^2$  absoluteness.

We shall discuss various further results on obtaining  $\Sigma_2^2$  absoluteness.

For the special session:

- (1) Ilijas Farah; College of Staten Island  
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- Title: Luzin gaps
- Abstract: Many questions about  $\mathcal{P}(\mathbb{N})/\text{Fin}$  are resolved assuming the Continuum Hypothesis and a recursive construction. If the size of the continuum is greater than  $\aleph_1$ , the existence of Hausdorff gaps stand in the way of such approach. In order to actually prove that a particular consequence of CH fails, one needs more than just assuming that CH fails. The technique of freezing gaps in  $\mathcal{P}(\mathbb{N})/\text{Fin}$  originated in the work of Luzin and Kunen and it was developed further by Abraham-Rubin-Shelah and Todorcevic. Extending this technique to related quotient algebras presents new technical difficulties, in particular because of the existence of ‘analytic Hausdorff gaps’ in some of these quotients. I will discuss the current state of knowledge on this topic and several applications.

- (2) Qi Feng; National University of Singapore and  
Institute of Mathematics, AMSS, CAS (Beijing)  
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- Title:
- Abstract:

- (3) Alexander S. Kechris; California Institute of Technology. (Sunday only)  
email: kechris@caltech.edu

- Title: Rigidity theorems for actions of product groups and countable Borel equivalence relations.

- Abstract: Under certain circumstances, if a countable group acts on a standard measure space, the orbit equivalence relation (together with the measure), and sometimes even the purely set theoretic object of the Borel cardinality of the orbit space, "encodes" or "remembers" many properties of the acting group. Starting with work of Zimmer, many important such "rigidity" phenomena have been discovered over the last two decades in ergodic theory and have been applied recently in solving several problems in the descriptive set theory of equivalence relations and the study of complexity of classification problems. In this talk, I will survey recent work by Gaboriau and Hjorth-Kechris to the effect that products of free groups (and related groups, like word-hyperbolic) exhibit such rigidity phenomena, and I will discuss the implications of such work in the theory of countable Borel equivalence relations.

(4) Richard Ketchersid; University of California, Los Angeles  
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- Title:
- Abstract:

(5) Paul Larson; Department of Mathematics  
University of Toronto, Canada  
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- Title: Iterations of Countable Models
- Abstract: We discuss iterated embeddings of countable models of ZFC by generic ultrapowers derived from the nonstationary ideal on  $\omega_1$ . We show that for each such model and each real number there is a unique shortest iteration of the model picking up the given real, if any. We also discuss some open problems in the area.

(6) Justin Moore; Boise State University, Idaho  
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- Title: Weak diamond and open colorings
- Abstract: I will discuss the relative consistency of certain statements about open colorings with  $2^{\aleph_0} < 2^{\aleph_1}$ . In particular both OCA and the statement that every 1-1 function of size  $\aleph_1$  is  $\sigma$ -monotonic are consistent with  $2^{\aleph_0} < 2^{\aleph_1}$ . As a corollary we have that  $2^{\aleph_0} < 2^{\aleph_1}$  does not admit a  $\mathbb{P}_{\max}$  variation (in the presence of an inaccessible cardinal).

(7) Martin Zeman; University of California, Irvine  
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- Title: Failure of squares from weak hypotheses.
- Abstract: I will discuss various square-like principles and introduce large cardinal axioms which suffice to separate such principles. It is known that a supercompact cardinal is enough for this task; I will present much weaker axioms which seem to be very close to optimal hypotheses.