SERGEY BEZUGLYI
Institute for Low Temperature Physics, Kharkov, Ukraine

Homeomorphic measures on a Cantor set

Two measures, μ and ν on a topological space X are called homeomorphic if there is a homeomorphism f of X such that $\mu(f(A)) = \nu(A)$ for any Borel set A. The question when two Borel probability non-atomic measures are homeomorphic has a long history. The well-known result of Oxtoby and Ulam gives a criterion when a Borel measure on the cube $[0,1]^n$ is homeomorphic to the Lebesgue measure. The situation is more difficult for measures on a Cantor set. There is no complete answer to the above question even in the simplest case of Bernoulli trail measures. In my talk, I will discuss the recent results about classification of Borel probability measures which are ergodic and invariant with respect to aperiodic substitution dynamical systems. In other words, we consider the set M of ergodic probability Borel measures on stationary non-simple Bratteli diagrams which are invariant with respect to the tail equivalence relation. The properties of these measures related to the clopen values set $S(\mu)$ are studied. It is shown that for every measure $\mu \in M$ there exists a subgroup $G \subset \mathbb{R}$ such that $S(\mu) = G \cap [0,1]$, i.e. $S(\mu)$ is group-like. A criterion of goodness is proved for such measures. Based on this result, we classify the good measures from M up to a homeomorphism. It is proved that for every good measure $\mu \in M$ there exist countably many measures $\{\mu_i\}_{i\in\mathbb{N}} \subset M$ such that the measures μ and μ_i are homeomorphic but the tail equivalence relations on the corresponding Bratteli diagrams are not orbit equivalent.

LEWIS BOWEN
Texas A&M University

Entropy of group actions on probability spaces

In 1958, Kolmogorov defined the entropy of a probability measure preserving transformation. Entropy has since been central to the classification theory of measurable dynamics. In the 70s and 80s researchers extended entropy theory to measure preserving actions of amenable groups (Kieffer, Ornstein-Weiss). My recent work generalizes the entropy concept to actions of sofic groups; a class of groups that contains for example, all subgroups of $GL(n, C)$. Applications include the classification of Bernoulli shifts over a free group, answering a question of Ornstein and Weiss.

PANDELIS DODOS
University of Athens

Density Ramsey theory for trees

We will review some recent advances in Ramsey Theory for trees focusing, in particular, on the Halpern-Lauchli Theorem.

The Halpern-Lauchli Theorem (discovered in 1966) is a deep pigeon-hole principle for trees. It concerns partitions of the level product of a finite sequence of finitely branching trees. It has been the main tool for the development of Ramsey Theory for trees, a rich area of Combinatorics with important applications in Functional Analysis and Topology.

A density version of the Halpern-Lauchli Theorem was conjectured from the late 1960s. This has been recently settled in the affirmative by Vassilis Kanellopoulos, Nikos Karagiannis and the speaker.

We will discuss aspects of the proof as well as results pointing towards understanding some quantitative invariants related to the density Halpern-Lauchli Theorem.

ILIJAS FARAH
York University

Classification of nuclear C-algebras and set theory*

We prove that the isomorphism relation for nuclear simple separable C*-algebras is not classifiable by countable structures. In passing, we prove that a wide variety of standard C*-algebra constructions correspond to Borel relations and functions. In particular, Elliott's invariant—K-theory, traces, and the bonding map between them—is Borel computable.

KEI FUNANO
Kumamoto university

Concentration of maps and group actions

In 1983 Gromov and Milman studies a topological fixed point theorem as an application of the theory of the L'evy-Milman concentration of measure phenomenon. They obtained that every continuous action of a Levy group on a compac metric space has a fixed point. Here a L'evy group is a metrizable topological group which is approximated from inside by an increasing chain of subgroups exhibiting the concentration of measure phenomenon. Nowadays many concrete examples of Levy groups are known (refer to the recent monograph by V. Pestov). Pursuing the idea of Gromov and Milman, we discuss actions of Levy groups on a large class of metric spaces from the viewpoint of the theory of concentration of maps.

ELI GLASNER
Tel Aviv University

Topological groups with Rohlin properties

In a classical paper P. R. Halmos shows that weak mixing is generic in the measure preserving transformations. Later, in his book, he gave a more streamlined proof of this fact based on a fundamental lemma due to V. A. Rohlin. For this reason the name of Rohlin has been attached to a variety of results, old and new, relating to the density of conjugacy classes in topological groups. I will review some of the new developments in this area and its connections to model theory.

YONATAN GUTMAN
Universit Paris-Est Marne-la-Valle

Minimal hyperspace actions of $Homeo(\beta\omega \setminus \omega)$

Let $\omega^* = \beta\omega \setminus \omega$, where $\beta\omega$ denotes the Stone-Čech compactification of the natural numbers. This space, called *the corona* or the *remainder* of ω, has been extensively studied in the fields of set theory and topology. We investigate minimal actions of $G = Homeo(\omega^*)$ on various hyperspaces of ω^*. Using the dual Ramsey Theorem and a detailed combinatorial analysis of what we call *stable collections* of subsets of a finite set, we obtain a complete list of the minimal sub-systems of the compact dynamical system $(Exp(Exp(\omega^*)), G)$, where $Exp(Z)$ stands for the hyperspace comprising the closed subsets of the compact space Z equipped with the Vietoris topology. The dynamical importance of this dynamical system stems from Uspenskij's characterization of the universal ambit of G. These results apply as well to the Polish group $Homeo(C)$, where C is the Cantor set.

JOSE IOVINO
The University of Texas at San Antonio

From discrete to continuous arguments in logic. What is needed and why

In recent years there has been considerable activity in generalizing to continuous settings techniques from logic (set theory and model theory) that initially were devised for discrete settings. Several model-theoretic frameworks have been proposed as formalisms for the continuous setting (Chang-Keisler, Henson, Ben-Yaacov); however, they have turned out to be equivalent. I will state a maximality theorem that, among other things, characterizes such frameworks. The characterization is in terms of omitting types, and applies not only to the already proposed formalisms, but to a wide range of logics, namely, logics for which certain topologies are uniformizable.

JAKUB JASINSKI
University of Toronto

Ramsey degrees of boron tree structures

We compute the Ramsey degrees of structures associated with the leaf sets of boron trees. Furthermore, we investigate extensions of these structures.

VADIM KAIMANOVICH
University of Ottawa

Continuity of the asymptotic entropy

We prove that the asymptotic entropy of random walks on discrete groups of isometries of Gromov hyperbolic or Riemannian symmetric spaces depends on their step distribution continuously

ALEKSANDRA KWIATKOWSKA
University of Illinois at Urbana-Champaign

Point realizations of near-actions of groups of isometries

By a classical theorem due to Mackey, every continuous homomorphism from a locally compact separable group G into $Aut(X, \mu)$ (the group of measure preserving transformations) has a point realization, that is, arises from a measure preserving action of G on (X, μ). Recently it was shown by Glasner, Tsirelson and Weiss that also every continuous homomorphism from a subgroup of the group of permutations of the natural numbers admits a point realization.

The class of groups of isometries of locally compact separable metric spaces properly contains the above two classes of groups. We show that the result holds here as well. The solution to Hilbert's fifth problem plays an essential role in our investigations. As a byproduct, we obtain a new characterization of groups of isometries of locally compact separable metric spaces.

CLAUDE LAFLAMME
University of Calgary

The hypergraph of copies of countable homogeneous structures.

We generally discuss the automorphism group of the hypergraph of copies of a countable homogeneous structure, particularly in relation to the automorphism group of the structure itself. We will review the rationals, and focus on the Rado and triangle (Kn) free graphs.

ARKADY LEIDERMAN
Ben-Gurion University, Beer Sheva ,Israel

On topological properties of the space of subgroups of a discrete group

Given a discrete group G, we consider the set $L(G)$ of all subgroups of G endowed with topology arising from the standard embedding of $L(G)$ into the Cantor cube $\{0,1\}^G$. The *cellularity* $c(X)$ is the supremum of cardinalities of disjoint families of open subsets of a topological space X. It has been shown in a joint paper of the speaker and I. Protasov that the cellularity $c(L(G))$ is countable for every infinite abelian group G; and, for any infinite cardinal τ, there exist a non-abelian group G with $c(L(G)) = \tau$.
In the second part of our talk we will review a complete description of the homeomorphism type of $L(G)$, when G is a *countable abelian group*. It has been done in a recent paper by Y. de Cornulier, L. Guyot and W. Pitsch.

HANFENG LI
SUNY at Buffalo

Entropy for actions of sofic groups

Classically entropy is defined for measure-preserving actions and continuous actions of countable amenable groups. The class of sofic groups includes all discrete amenable groups and residually finite groups. In 2008 Lewis Bowen defined entropy for measure-preserving actions of countable sofic groups, under the condition that the underlying space has generating partitions with finite entropy. I will give a definition of entropy for all measure-preserving actions and continuous actions of countable sofic groups, and discuss some properties of this entropy. Although the definition is in the language of dynamical systems, the proof for the well-definedness uses operator algebras in a fundamental way.

JULIEN MELLERAY
Univ. Lyon 1

Applications of continuous logic to the theory of Polish groups

There has long been a fruitful interaction between model theory and descriptive set theory, particularly regarding the theory of Polish groups. In my talk I will discuss applications of continuous logic (a version of first-order logic adapted to the setting of separable metric spaces rather than countable discrete structures) to the theory of Polish groups. I'll try to discuss examples where this has been fruitful (some new automatic continuity results, a continuous version of the small index property) as well as an example related to Ramsey theory and extreme amenability where continuous logic might be useful but the discrete setting seems essentially different from the continuous one.

MATTHIAS NEUFANG
The Fields Institute and Carleton University

Topological centres for group algebras, actions, and quantum groups

The study of topological centres has been a very active field in Banach algebra theory and abstract harmonic analysis for many years. I shall report on recent progress concerning the solution of various topological centre problems, on the one hand, and the use of such results as a tool, on the other hand. Particular emphasis will be placed on the following:

the positive solution, for a large class of compact non-metrizable groups, of the CecchiniZappa conjecture [1981] on the centre of the bidual of the Fourier algebra (joint work with M. Filali and M. Sangani Monfared) note that, as shown by V. Losert, the conjecture fails for the compact metrizable group SU(3);

the positive solution of the GhahramaniLau conjecture [1994] on the topological centres of the bidual of the measure algebra over a locally compact group (joint work with Stefano Ferri, V. Losert, J. Pachl and J. Steprans);

the negative solution of a question raised by Laulger [1996] on the structure of certain multipliers on von Neumann algebras (joint work with Z. Hu and Z.-J. Ruan);

the negative solution of FarhadiGhahramani's multiplier problem [2007];

topological centres for group actions and their relation to the number of invariant means for the action (joint work with J. Pachl and J. Steprans);

topological centres and invariant means for algebras over locally compact quantum groups (joint work with Z. Hu and Z.-J. Ruan).

JAN PACHL
Fields Institute

Uniform measures and ambitable groups

This presentation explores consequences of the relationship between two concepts that have been found useful in recent work on convolution algebras.

A uniform measure on a uniform space is a linear functional on the space of bounded uniformly continuous functions that is pointwise continuous on every uniformly equicontinuous set of functions. In some sense uniform measures are an appropriate substitute for finite Radon measures as we move from complete metric spaces or locally compact groups to more general spaces.

Using the language of topological dynamics, ambitability formalizes a certain factorization property in function spaces on (semi)groups. It is an open problem whether every topological group is either precompact or ambitable. However, the answer is positive for "most" topological groups, including all locally compact and all $\aleph_n$-bounded groups, $n = 1, 2, \ldots$. Along with general properties of uniform measures, this yields some known and some new results, including those about uniquely amenable groups and about Radon measures on locally compact groups in duality with bounded uniformly continuous functions.

VLADIMIR PESTOV
University of Ottawa

Ergodicity at identity of measure-preserving actions of Polish groups

A weakly continuous near-action of a Polish group G on a standard Lebesgue measure space (X, μ) is *whirly,* or *ergodic at identity,* if for every $A \subseteq X$ of strictly positive measure and every neighbourhood V of identity in G the set VA has full measure. This is a strong version of ergodicity, and locally compact groups never admit whirly actions. On the contrary, every ergodic action by a Polish Lévy group in the sense of Gromov and Milman, such as $U(\ell^2)$, is whirly (Glasner–Tsirelson–Weiss). We survey this direction of research, and in particular give examples of closed subgroups of the group $\mathrm{Aut}(X, \mu)$ of measure preserving automorphisms of a standard Lebesgue measure space (with the weak topology) whose tautological action on (X, μ) is whirly, and which are not Lévy groups, thus answering a question of Glasner and Weiss. Some open questions are discussed.

NORBERT SAUER
University of Calgary

On the oscillation stability of universal metric spaces

A countable metric space H with D as set of distances is universal if it is homogeneous and every finite metric space with set of distances a subset of D has an isometric embedding
into H. Two recent results will be discussed:

1. Every countable universal metric space with a finite set of distances is indivisible.
2. Given a countable universal metric space H with D as set of distances, D assumed to be bounded, and given an $\epsilon > 0$ there exists a countable metric subspace K with F as set of distances so that:
    (a) F is a finite subset of D.
    (b) For every point a in H there is a point a' in K so that $\mathrm{d}_{\mathrm{H}}(a, a') < \epsilon$.

Those results are steps towards the oscillation stability problem for universal metric spaces.
The notion of oscillation stability being a very general one coined by Pestov for topological
groups which due to a result of Pestov in the case of a metric space H and the group of

isometries of a metric space H turns into the problem of deciding whether H is approximately indivisible. That is, is it the case that for every partition of H into finitely many parts and every $\epsilon > 0$ there is an isometric copy of H in H whose distance from one of the
parts is at most ϵ.

It may appear to be the case, but unfortunately, as already observed by Lopez-Abad and Nguyen Van Thé, it is not the case that results 1. and 2. imply that every countable universal metric space is approximately indivisible. They showed 1. and 2. for the Urysohn
sphere with F the points of an equal partition of the interval $[0, 1]$ into m parts. Then they provided a quite complicated and ingenious construction to show that, given that universal metric spaces whose sets of distances are an initial interval of ω are indivisible, the Urysohn sphere is approximately indivisible. It has been shown by Nguyen Van Thé and Sauer that universal metric spaces whose sets of distances are an initial interval of ω are indivisible.

A direct modification of the Abad, Nguyen construction, using circular paths, will not work in the general case because the infimum of the path length they use may fall into a "hole" of the set of distances D of the space H. Nevertheless a careful analysis of their approach leads to a modification which for some interesting families of countable universal metric spaces, leads together with results 1. and 2., to the conclusion that those spaces are approximately indivisible.

J. Lopez-Abad and L. Nguyen Van Thé, The oscillation stability problem for the Urysohn
sphere: A combinatorial approach, *Topology Appl.* **155** Issue 14 (2008) 1516-1530.

L. Nguyen Van Thé, N. Sauer, The Urysohn Sphere is oscillation stable, *Goemetric and
Functional Analysis* **19** Issue 2 (2009) 536-557.

N. Sauer, Vertex partitions of metric spaces with finite distance sets, *Discrete Mathematics* submitted.

N. Sauer, Approximating universal metric spaces, manuscript.

KOSTYANTYN SLUTSKYY
University of Illinois at Urbana-Champaign

Classes of topological similarity in Polish groups

We will define a notion of topological similarity between tuples of elements in a Polish group. This relation is coarser than conjugacy relation, and is usually easier to deal with. We then discuss typical examples of groups with large and small classes of similarity. One of the central objects will be the group of isometries of the Urysohn space. We will mention some new results on extensions of partial isometries in this space, and illustrate their connection with conjugacy classes and classes of topological similarity.

MIODRAG SOKIC
California Institute of Technology

Posets with linear orderings

We give a list of classes of finite posets with linear orderings and classify them according to the Ramsey property.

SLAWOMIR SOLECKI
University of Illinois

Finite Ramsey theorems

Time allowing, the talk will explore three themes.

1. Structural Ramsey theorems incorporating functions, in addition to relations, into structures. The methods here give a new proof of Prömel's theorem and yield generalizations of theorems of Nešetřil–Rödl, Abramson–Harrington, and Prömel.

2. A general, "abstract algebraic" approach to unstructured Ramsey theorems (the classical Ramsey theorem, the Hales–Jewett theorem, and the dual Ramsey theorem of Graham–Rothschild).

3. A self-dual unstructured Ramsey theorem obtained by the methods of 2.

LIONEL NGUYEN VAN THÉ
Universit Aix-Marseille 3, Paul Czanne

Universal flows for closed subgroups of the permutation group of the integers

In their 2005 paper, Kechris, Pestov and Todorcevic showed that in order to compute the universal minimal flow of some closed subgroups of the permutation group of the integers, two combinatorial properties are relevant. Those are respectively called "Ramsey property" and "ordering property" (or more generally, "expansion property"). They proved that the expansion property is equivalent to minimality of a certain flow, while the conjunction of the Ramsey and the expansion property is equivalent to minimality and universality of this same flow. A natural question is therefore: Is Ramsey property alone equivalent to universality? The purpose of this talk is to give an answer to this question.

TODOR TSANKOV
Paris 7

Unitary representations of oligomorphic groups

I will discuss a new classification result for the unitary representations of oligomorphic permutation groups (or equivalently, automorphism groups of omega-categorical structures, or still equivalently, Roelcke precompact subgroups of S_∞). It turns out that every such group has only countably many irreducible representations and it is possible to describe them quite explicitly. This recovers older results of Lieberman about S_∞ and Olshanski about the linear group of an infinite-dimensional vector space over a finite field. We also establish property (T) for many of those groups.