2015 meeting – program

2015 Annual Meeting of the Israel Mathematical Union

Dead Sea, 28-31 May 2015

Program outline

Thursday, May 28th.	**Friday, May 29th.**	**Saturday, May 30th.**	**Sunday, May 31st.**
Special Sessions & Mini Workshops	**Plenary Lectures & Special Sessions**	**Informal discussions & Collaborations**	**Special Sessions & Mini Workshops**
16:00-17:30: Algebra and Representation Theory, Applied Mathematics, Combinatorics and Discrete Mathematics.	**09:30 – 16:30: Plenary Lectures**		**09:30 – 11:00: Algebra and Representation Theory, Number Theory, Symplectic Geometry & Hamiltonian Dynamics.**
17:45-19:15: Analysis and related topics, Number Theory, Symplectic Geometry & Hamiltonian Dynamics.	**Special Sessions:** **17:00 – 18:30: Applied Mathematics, Ergodic Theory and Dynamical Systems,**		**11:30 – 13:00: Analysis and related topics, Combinatorics and Discrete Mathematics, Ergodic Theory and Dynamical Systems.**

Detailed Program

General Session – Friday, May 29th.		
Location: TBA		
09:00 – 09:20	***Business Meeting***	
09:30 – 10:15	**Ron Shamir** (Tel Aviv University)	Some Current Computational Challenges in Bioinformatics (abstract)
10:15 – 10:30	Coffee break	
10:30 – 11:00	***Prize Ceremony***	
11:00 – 11:45	**Shiri Artstein Avidan** (Tel Aviv University – Erdos Prize recepient)	On polarity and duality in convexity and elsewhere (abstract)
12:00 – 12:45	**Mike Hochman** (Hebrew University – Erdos Prize recepient)	Dimension of fractal sets and measures via additive combinatorics (abstract)
13:00 – 14:30	Lunch	
14:30 – 15:20	**James Arthur** (University of Toronto – Wolf Prize recepient)	L-functions and functoriality (abstract)
15:45 – 16:30	**Dovi Poznanski** (Tel Aviv University)	Science, Not Fiction: Exploding Stars & Dark Energy (abstract)

17:00 – 18:30	***Special Sessions*** (Applied Mathematics, Ergodic Theory and Dynamical Systems) – see details below	

Special Sessions & Mini Workshops – Thursday, May 28th

Algebra and Representation Theory Organizers: Dima Gourevitch (Weizmann), Erez Lapid (Weizmann)		
Room: TBA		
16:00-16:55	**Avraham Aizenbud** (Weizmann Institute – Levitzki Prize recepient)	Representation count of arithmetic groups, moduli spaces of local systems, and pushforward of smooth distributions (abstract)
17:00-17:30	**Inna Entova-Aizenbud** (MIT)	Deligne categories and the limit of categories Rep(GL(m|n)) (abstract)
17:30-19:30	Informal discussions & Collaborations – Location TBA	
Applied Mathematics Organizer: Nir Gavish (Technion)		
Room : TBA		
16:00-16:30	**Issak Rubinstein** (Ben Gurion University)	Equilibrium Electro-convective Instability (abstract)
16:30-17:00	**Nir Gavish** (Technion)	Systematic interpretation of differential capacitance data (abstract)

17:00-17:30	**Tal Malinovitch** (Mathematics Department, Ben Gurion University & Physics Department, Nuclear Research Center of the Negev, (NRCN))	Multi-type time-continuous Markovian branching process in sub-critical systems (abstract)
17:30-19:30	Informal discussions & Collaborations – Location TBA	

Combinatorics and Discrete Mathematics

Organizer: Asaf Shapira (TAU)

Room: TBA

16:00-16:30	**Ehud Friedgut** (Weizmann)	An information theoretic proof of a hypercontractive inequality (abstract)
16:30-17:00	**Wojciech Samotij** (Tel Aviv University)	The structure of a random metric space (abstract)
17:00-16:00	**Michael Krivelevich** (Tel Aviv University)	Remarks on rainbow connection (abstract)
17:30-19:30	Informal discussions & Collaborations – Location TBA	

Analysis and related topics

Organizers: Boaz Klartag (TAU), Sasha Sodin (TAU)

Room: TBA

16:00-17:30	Informal discussions & Collaborations – Location TBA	

17:45-18:30	**Margherita Disertori** (Hausdorff Center for Mathematics, Bonn)	Some results on history dependent stochastic processes (abstract)
18:30-19:15	**Dan Mangoubi** (Hebrew University)	A gap in the error term of discrete three circles theorems (abstract)

Number Theory Organizers: Lior Bary-Soroker (TAU), Zeev Rudnick (TAU)		
Room: TBA		
16:00-17:30	Informal discussions & Collaborations – Location TBA	
17:45-18:10	**Lior Bary-Soroker** (Tel Aviv University)	Inverse Galois theory and sieves (abstract)
18:15-18:40	**Tamar Ziegler** (Hebrew University)	TBA (abstract)
18:45-19:10	**Ido Efrat (BGU)**	Massey products in number fields (abstract)

Symplectic Geometry & Hamiltonian Dynamics Organizers: Yaron Ostrover (TAU), Frol Zapolsky (Haifa U.)		
Room: TBA		
16:00-17:30	Informal discussions & Collaborations – Location TBA	
17:45-18:25	**Vinicius Ramos** (University of Nantes)	Toric domains, symplectic capacities and billiards (abstract)
18:35-19:15	**Will Merry** (ETH)	Floer homology on the extended phase space (abstract)

Special Sessions & Mini Workshops – Friday, May 29th

Applied Mathematics

Organizer: Nir Gavish (Technion)

Room: TBA

17:00-17:30	**Gershon Wolanski** (Technion)	Optimal partitions and applications (abstract)
17:30-18:00	**Adi Ditkowski** (Tel Aviv University)	High Order Schemes With Convergence Rate Higher Then Their Truncation Errors (abstract)
18:00-18:30	**Arik Yochelis** (Ben Gurion University)	Pattern formation by molecular motors in cellular protrusions: A laboratory for reaction-diffusion-advection media with conservation(abstract)

Ergodic Theory and Dynamical Systems

Organizer: Yair Glasner (BGU)

Room: TBA

17:00-17:45	**Nattalie Tamam** (TAU)	Obvious divergence for cones (abstract)
17:45-18:30	**Ohad Elishco** (BGU)	Semi-constrained systems (abstract)

Special Sessions & Mini Workshops – Sunday, May 31st

Algebra and Representation Theory

Organizers: Dima Gourevitch (Weizmann), Erez Lapid (Weizmann)

Room: TBA

09:30-09:55	**Kazuki Morimoto** (Weizmann Institutet)	Model transition for representations of unitary type (abstract)
10:00-10:25	**Stuart Margolis (**BIU**)**	CW-decompositions, Leray numbers and the representation theory and cohomology of left regular band algebras (abstract)
10:30-10:55	**Arie Levit** (Weizmann Institutet)	Invariant Random Subgroups of non-Archimedean Groups (abstract)
11:00-14:00	Informal discussions & Collaborations – Location TBA	

Number Theory

Organizers: Lior Bary-Soroker (TAU), Zeev Rudnick (TAU)

Room: TBA

09:30-09:55	**Xin Zhang** (Tel Aviv University)	Gap distributions on circle packings (abstract)
10:00-10:25	**Steve Lester** (Tel Aviv University)	Quantum variance for toral eigenfunctions (abstract)
10:30-10:55	**Tal Horesh** (Technion)	A problem of counting lattice points in the hyperbolic space (abstract)
11:00-14:00	Informal discussions & Collaborations – Location TBA	

Symplectic Geometry & Hamiltonian Dynamics

Organizers: Yaron Ostrover (TAU), Frol Zapolsky (Haifa U.)

Room: TBA		
09:30-10:10	**Asaf Kislev** (TAU)	Hofer Growth of C^1-generic Hamiltonian flows (abstract)
10:20-11:00	**Milena Pabiniak** (Instituto Superior Tecnico in Lisbon)	On displaceability of pre-Lagrangians in toric contact manifolds (abstract)
11:00-14:00	Informal discussions & Collaborations – Location TBA	
Analysis and related topics Organizers: Boaz Klartag (TAU), Sasha Sodin (TAU)		
Room: TBA		
09:30-11:00	Informal discussions & Collaborations – Location TBA	
11:30-12:15	**Avner Kiro** (TAU)	Beurling's method in the theory of quasianalytic functions (abstract)
12:15-13:00	**Alon Nishry** (University of Michigan)	Hole probability and conditional distributions – zeros and eigenvalues (abstract)
Combinatorics and Discrete Mathematics Organizer: Asaf Shapira (TAU)		
Room: TBA		

09:30-11:00	Informal discussions & Collaborations – Location TBA	
11:30-12:00	**Yonutz V. Stanchescu** (Afeka Academic College and The Open University of Israel)	The linear structure of sets of lattice points with small doubling property (abstract)
12:00-12:30	**Raphy Yuster** (Haifa)	A tournament approach to pattern avoiding matrices (abstract)
12:30-13:00	**Benny Sudakov** (ETH)	Grid Ramsey problem (abstract)

Ergodic Theory and Dynamical Systems

Organizer: Yair Glasner (BGU)

Room: TBA

09:30-11:00	Informal discussions & Collaborations – Location TBA	
11:30-12:15	**Eli Glasner** (TAU)	Is there a Ramsey-Hindman theorem ? (abstract)
12:15-13:00	**Yair Hartman** (Weizmann)	Property (T) and the Furstenberg entropy of non-singular actions (abstract)

Abstracts

By order of appearance

Ron Shamir (Tel Aviv University)

Some Current Computational Challenges in Bioinformatics

Abstract: The accumulation of diverse genomic data (and other types of 'omics' data) on massive scale creates challenges – and opportunities. Bioinformatics – using techniques from computer science, mathematics and statistics – must address these challenges now. We describe some of the key problems, and demonstrate our efforts towards some of them.

Shiri Artstein Avidan (Tel Aviv University)

On polarity and duality in convexity and elsewhere

Abstract: We shall explore the role of polarity and duality in the area of asymptotic (and classical) convex geometry and in other related fields. We shall discuss polarity/duality and its usage both as a geometric and analytic tool and as a mechanism for gaining intuition.

Mike Hochman (Hebrew University)

Dimension of fractal sets and measures via additive combinatorics

Abstract: I will discuss the recent application of ideas from additive combinatorics to the study of the dimension of some classical fractal sets and measures, including Bernoulli convolutions and the "1-dimensional Sierpinski gasket"..

James Arthur (University of Toronto)

L-functions and functoriality

Abstract: We shall recall Langlands' principle of functoriality, with its motivation in terms of automorphic L-functions. We shall then discuss recent progress on the endoscopic classification of automorphic representations, with its implications for functoriality. Finally, time permitting, we shall something about "Beyond Endoscopy", the program of Langlands for attacking the general principle of functoriality using the trace formula and the analytic behaviour of L-functions. This talk will be aimed at nonexperts.

Dovi Poznanski (Tel Aviv University)

Science, Not Fiction: Exploding Stars & Dark Energy

Abstract: For the past 18 years we have accumulated evidence that the Universe is accelerating under the influence of a mysterious and significant component of the energy density, which we call Dark Energy. the main vector for discovery were observations of stellar explosions called Type Ia supernovae. I will discuss these findings and the puzzles they raise.

Avraham Aizenbud (Weizmann Institute)

Representation count of arithmetic groups, moduli spaces of local systems, and pushforward of smooth distributions

Abstract: Representation count, rational singularities of deformation varieties, and pushforward of smooth distributions: We will discuss the following question: How much irreducible representations of a given dimension n dose groups like $SL_d(\Z)$ have? We will see how this question is related to Singularities of moduli spaces, pushforward of smooth distributions, commutators of random elements in finite groups, jet schemes and more. As a result we will show that the number of such representations is bounded by polynomial in n whose degree is universality bounded for a large class of discrete groups (by 1000).

Inna Entova-Aizenbud (MIT)

Deligne categories and the limit of categories Rep(GL(m\|n))

Abstract: Deligne categories Rep(GL_t) (for a complex parameter t) have been constructed by Deligne and Milne in 1982 as a polynomial extrapolation of the categories of algebraic representations of the general linear groups GL_n(C). In this talk, we will show how to construct a "free abelian tensor category generated by one object of dimension t", which will be, in a sense, the smallest abelian tensor category which contains the respective Deligne's category Rep(GL_t). The construction is based on an interesting stabilization phenomenon occurring in categories of representations of supergroups GL(m\|n) when t is an integer and m-n=t. This is a joint project with V. Seganova and V. Hinich.

Issak Rubinstein (Ben Gurion University)

Equilibrium Electro-convective Instability

Abstract: Since its prediction fifteen years ago, hydrodynamic instability in concentration polarization at a charge-selective interface has been attributed to non-equilibrium electro-osmosis related to the extended space charge which develops at the limiting current. This attribution had a double basis. Firstly, it has been recognized that neither equilibrium electro-osmosis nor bulk electro-convection can yield instability for a perfectly charge-selective solid. Secondly, it has been shown that non-equilibrium electro-osmosis can. First theoretical studies in which electro-osmotic instability was predicted and analyzed employed the assumption of perfect charge-selectivity for the sake of simplicity and so did the subsequent studies of various time-dependent and nonlinear features of electro-osmotic instability. Here, we report that relaxing the assumption of perfect charge-selectivity (tantamount to fixing the electrochemical potential of counterions in the solid) allows for an equilibrium electro-convective instability.

Nir Gavish (Technion)

Systematic interpretation of differential capacitance data

Abstract: The contact between a charged object (metal surface, macromolecule, membrane, etc.) and an electrolyte solution results in the rearrangement of ion distribution near the interface and formation of the so-called electrical double layer. One of the important experimentally available quantities for characterizing the structure of electrolyte solutions near such interfaces are differential capacitance measurements. From a mathematical point of view, the double layer structure is commonly modeled by the Poisson-Boltzmann equation and generalizations of it. In this

work, we conduct a systematic study of the differential capacitance data. In particular, we focus on the inverse problem: Given differential capacitance data, we ask whether it is possible to derive a generalized Poisson-Boltzmann model which gives rise to the prescribed data. We show that such models do exist, characterize their variational action in terms of a PDE, and provide a method for solving the PDE and deriving the appropriate generalized Poisson-Boltzmann model. This method does not yield a unique model, and so we find that a wide class of models can give rise to the same differential capacitance data. Using our method, we derive generalized Poisson-Boltzmann models from differential capacitance data coming from either theoretical models or experimental measurements. In particular, derive novel models which accurately recover experimental data. This is a joint work with Keith Promislow

Tal Malinovitch (Nuclear Research Center of the Negev – NRCN)

Multi-type time-continuous Markovian branching process in sub-critical systems

Abstract: The Stochastic Transport Equation describes the number distribution of a population governed by a birth, death and branching event rates, often referred to as a "Continuous time Markovian branching process" . Continuous time branching processes are a common model of the neutron population in a fissionable system. In particular, the stochastic transport equation is often used in the context of the so called Feynman – α method, here the first two moments are used to evaluate the decay rate of the system. In the study, we have extended the traditional model into a multi type setting. In particular, we have demonstrated that the classic results have a very elegant Matricidal representation, if the proper formalism is used.

Ehud Friedgut (Weizmann Institute)

An information theoretic proof of a hypercontractive inequality

Abstract: In the famous KKL (Kahn-Kalai-Linial) paper of 1988 the authors "imported" to combinatorics and theoretical computer science a hypercontractive inequality known as Beckner's ineqaulity (proven first, independently, by Gross and Bonami). This inequality has since become an extremely useful and influential tool, used in tens of papers, in a wide variety of settings. In many cases there are no proofs known that do not use the inequality. In this talk I'll try to illuminate the information theoretic nature of both the inequality and its dual, touch upon a proof of the dual version from about a decade ago, (joint with V. Rodl), and a fresh (and unrelated) information theoretic proof of the primal version. No prior knowledge will be assumed regarding discrete Fourier analysis, Entropy, and hypercontractivity.

Wojciech Samotij (Tel Aviv University)

The structure of a random metric space

Abstract: What does a typical metric space on n points look like? To formalise this question, we consider the set of all metric spaces on n points whose diameter is at most 2. Viewing every metric space as a vector of distances, this set becomes a convex polytope in R^{\binom{n}{2}}, the so-called `metric polytope'. A random metric space is then a space chosen according to the normalised Lebesgue measure on this polytope. It is easy to

see that the metric polytope contains the cube [1,2]^{\binom{n}{2}}. Our main result is that it does not contain much more. Precisely, we show that a random metric space is very rigid, having all distances in an interval of the form [1-n^{-\eps}, 2] with high probability. This is joint work with Gady Kozma, Tom Meyerovitch, and Ron Peled.

Michael Krivelevich (Tel Aviv University)

Remarks on rainbow connection

Abstract: An edge (vertex) colored graph is rainbow-connected if there is a rainbow path between any two vertices, i.e. a path all of whose edges (internal vertices) carry distinct colors. Rainbow edge (vertex) connection of a graph G is the smallest number of colors needed for a rainbow edge (vertex) coloring of G.

We propose a very simple approach to studying rainbow connection in graphs. Using this approach, we give a unified proof of several known results, such as: – the edge rainbow connection on an n-vertex graph of minimum degree d is O(n/d) (Krivelevich, Yuster'2009); – the edge rainbow connection of a random d-regular graph on n vertices is typically O(log n/log d) (Dudek, Frieze, Tsourakakis'2013). Some new results are derived as well. A joint work with Nina Kamcev and Benny Sudakov (ETH Zurich).

Margherita Disertori (Hausdorff Center for Mathematics, Bonn)

Some results on history dependent stochastic processes

Abstract: Edge reinforced random walk (ERRW) and vertex reinforced jump processes (VRJP) are history dependent stochastic processes, where the particle tends to come back more often on sites it has already visited in the past. For a particular scheme of reinforcement these processes are random walks in random environment (mixing of reversible Markov chains) whose mixing measure can be related to a non-linear sigma model introduced in the context of random matrix models for quantum diffusion. I will give an overview on these models and explain some recent results.

Dan Mangoubi (Hebrew University)

A gap in the error term of discrete three circles theorems

Abstract: We prove an absolute monotonicity result related to discrete harmonic functions. As a consequence we get a discrete three circles theorem with an inherent error term. We show that the error term is sharp and exhibits a surprising gap phenomenon. This is joint work with Gabor Lippner.

Lior Bary-Soroker (Tel Aviv University)

Inverse Galois theory and sieves

Abstract: In this talk we will discuss a strong variant of the inverse Galois problem, called the minimal ramification problem. Given a finite group G, this problem asks for what is the minimal number of ramified primes in a number field N, where N varies over Galois extensions of the rationals with group G.

For example, it is conjectured that for the symmetric group S_n the answer is 1, while it is open whether this number is bounded with n. We will introduce a new method to attack this problem that combines algebraic tools from field arithmetic with analytic tools from sieve theory (e.g. the recent Green-Tao-Ziegler theorem). One of the many consequences of the general theory is that S_n can be realized with 4 ramified primes for any n. This is based on a joint work with Tomer Schlank.

Tamar Ziegler (Hebrew University)

TBA

Abstract: TBA

Ido Efrat (Ben Gurion University)

Massey products in number fields

Abstract: (Joint work with Eli Matzri) A famous topological construction, historically called the "Borromean rings", consists of three linked circles in R^3, where any two circles can be separated one from each other, but the whole link cannot be separated into its three circles. Behind this surprising phenomena lies a cohomological fact, that a certain "Massey product" is non-trivial. One may ask whether an analogous phenomena is possible for number fields, and this was recently answered by Hopkins, Wickelgren, Minac, and Tan. We extend their results, and show how they fit into the general picture of global class field theory. For general fields, we relate this to classical results by Albert on tensor products of quaternion algebras.

Vinicius Ramos (University of Nantes)

Toric domains, symplectic capacities and billiards

Abstract: In this talk, I will talk about symplectic embeddings of four-dimensional toric domains and I will describe a new result connecting the space of billiards on a round disk with a toric domain. I will explain how certain symplectic capacities coming from embedded contact homology can be used to show that some embeddings are sharp.

Will Merry (ETH)

Floer homology on the extended phase space

Abstract: Rabinowitz Floer homology is a version of Floer homology for Hamiltonian periodic orbits having prescribed energy. It was introduced by K. Cieliebak and U. Frauenfelder in 2009. Rabinowitz Floer homology has several applications: it can be used to prove various versions of the Weinstein conjecture on the existence of periodic orbits on contact type hypersurfaces, gives obstructions to the existence of exact open symplectic embeddings, can be used to study Moser's problem of leafwise intersections, and is a productive tool in the study of the symplectic properties of energy levels of magnetic flows and orderability questions in contact geometry. In my talk I will explain recent joint work with A. Abbondandolo which shows how Rabinowitz Floer homology can be seen as a standard Floer homology for fixed period Hamiltonian orbits on an extended phase space, and discuss applications of this result.

Gershon Wolanski (Technion)

Optimal partitions and applications

Abstract: I will review the notion of optimal partition and its relation to Monge-Kantorovich (Optimal transport) theory and present several applications, which include algorithms for optimal transport., a cooperative game and pricing in hedonic markets.

Adi Ditkowski (Tel Aviv University)

High Order Schemes With Convergence Rate Higher Then Their Truncation Errors

Abstract: Typically when a semi-discrete approximation to a partial differential equation (PDE) is constructed a discretization of the spatial operator with a truncation errorτ is derived. This discrete operator should be semi-bounded for the scheme to be stable. Under these conditions the Lax–Ricchtmyer equivalence theorem assures that the scheme converges and that the error will be, at most, of the order of $|| \tau ||$. In most cases the error is in indeed of the order of $|| \tau ||$. We demonstrate that for the Heat equation stable schemes can be constructed, whose truncation errors are τ, however, the actual errors are much smaller. This gives more degrees of freedom in the design of schemes, which can make them more efficient (more accurate or compact) than standard schemes. In some cases, the accuracy of the schemes can be further enhanced using post-processing procedures.

REFERENCES: [1] B. Gustafsson, H.O. Kreiss, and J. Oliger. îTime-dependent problems and difference methodsî. John Wiley & Sons, 1995.

Arik Yochelis (Ben Gurion iversity)

Pattern formation by molecular motors in cellular protrusions: A laboratory for reaction-diffusion-advection media with conservation

Abstract: Actin-based cellular protrusions are an ubiquitous feature of cells, performing a variety of critical functions from cell-cell communication to cell motility. The formation and maintenance of these protrusions relies on the transport of proteins via molecular motors, to the protrusion tip. While tip-directed motion leads to accumulation of motors (and their molecular cargo) at the protrusion tip, it is observed that motors also form rearward moving, periodic and isolated aggregates. Not only that these aggregates are apparently important to the recycling of the motors but also their origins and mechanisms are open puzzles. Motivated by novel experiments, a mass conserving nonlinear reaction-diffusion-advection model

is proposed. Analysis of the model provides paramount and general insights into pattern selection mechanisms that agree with experiments, i.e., it is shown how bifurcations and boundary conditions lead to emergence of pulses and traveling waves in conserved-reaction-diffusion-advection media.

Nattalie Tamam (**Tel Aviv University)**

Obvious divergence for cones

Abstract: Many Diophantine properties have a dynamical interpretation. We will discuss the one concerning divergence on cones, and see what stands behind the definition of the obvious ones. We will see some results concerning obvious divergent trajectories under the action of cones.

Ohad Elishco (**Ben Gurion University**)

Semi-constrained systems

Abstract: When transmitting information over a noisy channel, two approaches, dating back to Shannon's work, are common: assuming the channel errors are independent of the transmitted content and devising an error-correcting code, or assuming the errors are data dependent and

devising a constrained-coding scheme that eliminates all offending data patterns. In this paper we analyze a middle road, which we call a semiconstrained system. In such a system, which is an extension of the channel with cost constraints model, we do not eliminate the

error-causing sequences entirely, but rather restrict the frequency in which they appear.

We address several key issues in this study. The first is proving closed-form bounds on the capacity which allow us to bound the asymptotics of the capacity. In particular, we bound the rate at which the capacity of the semiconstrained $(0,k)$-RLL tends to 1 as k

grows. The second key issue is devising efficient encoding and decoding procedures that asymptotically achieve capacity with vanishing error. Finally, we consider delicate issues involving the continuity of the capacity and a relaxation of the definition of

semiconstrained systems.

Kazuki Morimoto (Weizmann Institute)

Model transition for representations of unitary type

Abstract: Model transition for representations of unitary type: In the representation theory of p-adic reductive groups, a unique model is important object. In some cases, an irreducible representation has two different unique models. In this talk, we will talk about a relationship between Whittaker model and (GL(2n, F), 1)-model for representations of GL(2n, E) where E / F is a quadratic extension of non-arhimedean local field of

characteristic zero. In particular, we will construct integral transforms for these models with explicit inversion formulas, which we call a model transition. Also, we will consider a similar problem for some Langlands quotients of unitary group U(4n).

Stuart Margolis (Bar Ilan University)

CW-decompositions, Leray numbers and the representation theory and cohomology of left regular band algebras

Abstract: Over the last 15 years, it has been noted that many combinatorial structures, such as real and complex hyperplane arrangements, interval greedoids, matroids, oriented matroids, and others have the structure of a finite monoid called a left regular band (LRB). The representation theory of the monoid algebra has had a major influence on understanding these objects along with related structures such as finite Coxeter groups and various Markov processes. In return, this has spurred a deeper development of the representation theory and cohomolgy theory of LRB algebras and more general classes of finite monoids. In particular, the Ext spaces between simple LRB modules over a field turn out to be intimately related to the cohomology of the order complex of the poset of principal right ideals of the LRB and other related simplicial complexes. For most of the examples that occur in the literature, the poset in question is the poset of faces of a CW decomposition of spheres of various dimensions. This leads to an unexpected relationship between cellular topology, the global dimension of LRB algebras and Leray numbers. All terms will be defined in the talk.

Arie Levit (Weizmann Institute)

Invariant Random Subgroups of non-Archimedean Groups

Abstract: Let G be a simple linear group over a non-Archimedean field. We study the collection of closed subgroups of G as a topological space. An invariant random subgroup is a probability measure on that space which is invariant under conjugation. In particular this notation generalizes lattices. We prove a variant of the Borel density theorem in this setting. Moreover in high rank we prove a rigidity theorem for invariant random subgroups, which is a generalization of the normal subgroup theorem. Combining our rigidity result with a recent work of Sauer and Thom on L2-betti numbers in totally disconnected locally compact groups, we obtain an approximation result of L2-betti numbers in terms of the betti numbers of sequences of lattices in G. This is a joint work with Tsachik Gelander.

Xin Zhang (Tel Aviv University)

Gap distributions on circle packings

Abstract: Given a configuration of finitely many tangent circles, one can form a packing of infinitely many circles by Möbius inversions. Fixing one circle from such a packing, we study the distribution of tangencies on this circle. Specifically, we will use Anton Good's theorem to show that these tangencies are uniformly distributed when naturally ordered by a growing parameter, and the limiting gap distribution exists, which is conformally invariant. This is a joint work with Zeev Rudnick.

Steve Lester (Tel Aviv University)

Quantum variance for toral eigenfunctions

Abstract: I will describe some recent results on the distribution of the L^2-mass of eigenfunctions of the Laplacian on the flat torus \mathbb T^d/2\pi \mathbb R^d. A special case of a result of Marklof and Rudnick implies that the L^2-mass of almost all such eigenfunctions equidistributes with respect to Lebesgue measure for d=2. I will discuss results on both the rates and scales at which the L^2-mass equidistributes and relate these questions to arithmetic problems such as representing integers as sums of squares and the distribution of lattice points. (Joint work with Zeev Rudnick.)

Tal Horesh (Technion)

A problem of counting lattice points in the hyperbolic space

Abstract: We present a solution for a problem of counting lattice points in a family of expanding domains in the hyperbolic space, and deduce a generalization of an equidistribution result by Anton Good. This in turn implies a generalization of a result due to Morton Risager and Zeev Rudnick on the statistics of the shortest solution to the

Diophantine equation ax-by=1, from Z to rings of integers in quadratic number fields. This is a joint work with Amos Nevo.

Asaf Kislev (Tel Aviv Univeristy)

Hofer Growth of C^1-generic Hamiltonian flows.

Abstract: We prove that on certain closed symplectic manifolds a C^1-generic cyclic subgroup of the universal cover of the group of Hamiltonian diffeomorphisms is undistorted with respect to the Hofer metric.

Milena Pabiniak (Instituto Superior Tecnico in Lisbon)

On displaceability of pre-Lagrangians in toric contact manifolds

Abstract: In symplectic geometry one can observe a rigidity of intersections: certain (Lagrangian) submanifolds are forced to intersect each other in more points than an argument from algebraic or differential topology would predict. For example, every compact symplectic toric manifold contains a non-displaceable (i.e. one that cannot be made disjoint from itself by the means of a Hamiltonian isotopy) Lagrangian toric fiber. In contact geometry, pre-Lagrangians play a related role. We define this notion and explore the question of displaceability of pre-Lagrangian toric fibers in toric contact manifolds. We obtain some results complementary to the symplectic rigidity case. They seem to be linked to orderability and the freeness of the toric action in some not yet fully understood way. In particular, the non-orderable contact toric manifolds S^{2d-1}, $S^1 x

S^{2d}$, $d>1$, have all their pre-Lagrangian toric fibers displaceable, while the co-sphere bundles $T^d \times S^{d-1}$, $d>1$, equipped with a free toric action, have all their pre-Lagrangian toric fibers non-displaceable. We discuss possible generalizations of these examples. In the talk I will mention results from a joint work with Aleksandra Marinkovic.

Avner Kiro (Tel Aviv University)

Beurling's method in the theory of quasianalytic functions

Abstract: The talk will be devoted to two questions in the theory of quasianalytic Carleman classes. The first one is how to describe the image of a quasianalytic Carleman class under Borel's map $f \to \{ f(n)(0) / n! \}n \geq 0$? The second one is how to sum the formal Taylor series of functions in quasianalytic Carleman classes? In the talk, I will present a method of Beurling that gives a solution to both of the problems for some quasianalytic Carleman classes. If time permits, I will also discuss the image problem in some non-quasianalytic classes.

Alon Nishry (University of Michigan)

Hole probability and conditional distributions – zeros and eigenvalues

Abstract: A 'Hole' is an event where a point process has no points inside a given domain. One can then consider the conditional distribution of the point process, given the hole event. I will consider two particular cases, (the zeros of) the 'flat' Gaussian entire function and the Ginibre ensemble.

Yonutz V. Stanchescu (Afeka Academic College and The Open University of Israel)

The linear structure of sets of lattice points with small doubling property

Abstract: Let K be a finite set of lattice points of affine dimension d= dim (K) = 3. If |K| is sufficiently large and if |K+K| < (5 – 2/s) (|K|-1) – 2s+2, then K lies on no more than s parallel lines. Moreover, under the additional assumption |K+K|<4.6|K|-12.6, we give a sharp estimate for the number v of lattice points of the convex hull of K. These results are best possible and cannot be sharpened by reducing the quantity v or by increasing the upper bound for |K+K|. If time allows, we will present some similar results for d-dimensional sets (d>2) with doubling coefficient less than d + 2 – s / (s-d+3).

Raphy Yuster (Haifa University)

A tournament approach to pattern avoiding matrices

Abstract: We consider the following Tur\'an-type problem: given a fixed tournament H, what is the least integer t=t(n,H) so that adding t edges to any n-vertex tournament, results in a digraph containing a copy of H. Similarly, what is the least integer t=t(T_n,H) so that adding t edges to the n-vertex transitive tournament, results in a digraph containing a copy of H. Besides proving several results on these problems, our main contributions are the following: 1. Pach and Tardos conjectured that if M is an acyclic 0/1 matrix, then any n x n matrix with n(\log n)^{O(1)} entries equal to 1

contains the pattern M. We show that this conjecture is equivalent to the assertion that t(T_n,H)=n(\log n)^{O(1)} if and only if H belongs to a certain (natural) family of tournaments. 2. We propose an approach for determining if t(n,H)=n(\log n)^{O(1)}. This approach combines expansion in sparse graphs, together with certain structural characterisations of H-free tournaments. Our result opens the door for using structural graph theoretic tools in order to settle the Pach-Tardos conjecture. Joint work with Asaf Shapira.

Benny Sudakov (ETH)

Grid Ramsey problem

Abstract: The Hales-Jewett theorem is one of the pillars of Ramsey theory, from which many other results follow. A celebrated result of Shelah says that Hales-Jewett numbers are primitive recursive. A key tool used in his proof, known as cube lemma, has become famous in its own right. In its simplest form, it says that if we color the edges of the Cartesian product $K_n \times K_n$ in r colors then, for n sufficiently large, there is a rectangle with both pairs of opposite edges receiving the same color. Hoping to improve Selah's result, Graham, Rothschild and Spencer asked more than 20 years ago whether cube lemma holds with n, which is polynomial in r. We show that this is not possible by providing a superpolynomial lower bound in r. Joint work with Conlon, Fox and Lee.

Eli Glasner (Tel Aviv University)

Is there a Ramsey-Hindman theorem ?

Abstract: I will show that there does not exist a joint generalization of the theorems of Ramsey and Hindman, or more explicitly, that the property of containing a symmetric finite-sum (SIP) sets is not divisible. This is a joint work with Ethan Akin.

Yair Hartman (Weizmann)

Property (T) and the Furstenberg entropy of non-singular actions.

Abstract: In this talk we'll discuss the Furstenberg entropy of non-singular actions. In particular, we are interested in the question: for a given measure on a group, are there arbitrarily small values for the entropy? Nevo showed that groups with property (T) cannot have arbitrarily small values. In a recent work with Lewis Bowen and Omer Tamuz we proved the converse of this theorem and thus provide a new characterization of property (T) of countable groups in terms of the Furstenberg entropy.

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