Workshop on Group Theory
on the occation of Arye Juhasz' 70th Birthday
4-6.1.2017
Titles & Abstracts

Inna Bumagin (Carleton University)

Title: *Makanin-Razborov diagrams over relatively hyperbolic groups.*

Abstract: Let G be a finitely generated relatively hyperbolic group. Our goal is to give a description of the set of homomorphisms Hom(L,G) from a finitely generated G-limit group L to G in terms of a finite directed rooted tree. The vertices of the tree correspond to G-limit quotients of L and the edges correspond to epimorphisms.

This is joint work with Nicholas Touikan.

Ruth Charney (Brandeis University)

Title: *Convexity of Parabolic Subgroups of Artin Groups*

Abstract: This talk concerns joint work with Luis Paris, inspired by a question from Arye Juhasz. Little is known about geometric or algorithmic properties of general Artin groups. For many of these groups, it is not even known if the word problem is solvable. One fact that is known is that the subgroup generated by a subset of the standard generating set (known as a parabolic subgroup) is itself an Artin group. We prove that every such parabolic subgroup is convex in the original Artin group.

Andrew Duncan (Newcastle University)

Title: *One relator products of partially commutative groups*.

Martin Edjvet (Nottingham University)

Title: *Asphericity of relative presentations*

Abstract: the asphericity of certain relative presentations will be discussed with applications to showing groups infinite. (Joint work with Arye Juhasz)

Gili Golan (Vanderbilt University)

Title: *The generation problem in Thompson group F*

Abstract: We show that the generation problem in Thompson group F is decidable, i.e., there is an algorithm which decides whether a finite set of elements of F generates the whole F. The algorithm makes use of the Stallings 2-core of subgroups of F, which can be defined in an analogous way to the Stallings core of subgroups of a free group. An application of the algorithm shows that F is a cyclic extension of a group K which has a maximal elementary amenable subgroup B. The group B is a copy of a subgroup of F constructed by Brin and Navas.

Shamgar Gurevich (UW-Madison and Yale)

Title: *"Small" Representations of Finite Classical Groups.*

Abstract: Suppose you have a finite group G and you want to study certain related structures (e.g., random walks, Cayley graphs, word maps, etc.). In many cases, this might be done using sums over the characters of G. A serious obstacle in applying these formulas is lack of knowledge on the low dimensional representations of G. In fact, numerics shows that the "small" representations tend to contribute the largest terms to these sums, so a systematic knowledge of them might assist in the solution of important problems.

In this talk I will discuss a joint project (see arXiv:1609.01276) with Roger Howe (Yale). We introduce a language to speak about "size" of a representation, and we develop a method for systematically construct (conjecturally all the) "small" representations of finite classical groups.

I will illustrate our theory with concrete motivations and numerical data obtained with John Cannon (MAGMA, Sydney) and Steve Goldstein (Scientific computing, Madison).

Alex Lubotzky (The Hebrew University of Jerusalem)

Title: *Permutaions' equations and group theoretic testability*

Abstract: Given two permutations A and B which "almost" commute; are they "close" to permutations A' and B' which really commute?

Studying a similar type of a problem for more general equations, lead to the notion of "locally testable groups" (aka "stable group").

We will take the opportunity to say something about "local testability" in general, which is an important subject in computer science.

We will then describe some results and methods developed (in a work in progress) together with Oren Becker, to decide whether various groups are testable or not.

This will bring in some important notions in group theory, such as amenability, Kazhdan property T and sofic groups.

Luis Paris (Université de Bourgogne)

Title: *Linear representations of Artin groups and automorphisms*

Abstract: Our starting point will be a theorem of Krammer and Bigelow which says that the braid group is linear.
After the announcement of this result, the experts tried to extend the construction of the linear representation to other groups.
One of the most fruitful extension was to the Artin groups:
Krammer's construction was extended to the simply laced Artin groups of spherical type by Cohen--Wales and Digne, and then to all simply laced Artin groups without triangles by myself.
In this talk we will present a method for constructing such representations for some non simply laced Artin groups, by means of automorphisms of the defining graphs.

Eugene Plotkin (Bar-Ilan University)

Title: *Word equations with constants*.

Abstract: I will survey some old and new results on word maps with the focus on word maps with constants.

It turns out that a sort of Borel's dominancy theorem for word maps evaluated on simple algebraic groups remains valid for word maps with constants.

Doron Puder (Tel Aviv University)

Title: *Word Measures on Unitary Groups*

Abstract: Since the 1970's, Physicists and Mathematicians who study random matrices in the standard models of GUE or GOE, are aware of intriguing connections between integrals of such random matrices and enumeration of graphs on surfaces. We establish a new aspect of this theory: for random matrices sampled from the group U(n) of Unitary matrices. The group structure of these matrices allows us to go further and find surprising algebraic quantities hidden in the values of these integrals. This is joint work with Michael Magee.

Ilya Rips (The Hebrew University of Jerusalem)

Title and abstract: TBA…

Igor Rivin (University of St. Andrews)

Title and abstract: TBA…

Mark Sapir (Vanderbilt University)

Title: *Flat submaps in CAT(0) (p,q)-maps and maps with angles*

Abstract: This is a joint work with A. Olshanskii. Let p, q be positive integers with $1/p+1/q=1/2$. We prove that if a (p,q)-map M does not contain flat submaps of radius $\ge r$, then its area does not exceed $c(r+1)n$ where n is the perimeter of M and c is an absolute constant.

Earlier Ivanov and Schupp proved an exponential bound in terms of r. We prove an estimate similar to Ivanov and Schupp for much more general ``maps with angles'' which include, for example, van Kampen diagrams over the presentation of the Baumslag-Solitar group $BS(1,2)$ and many groups corresponding to S-machines.

We also show that a (p,q) map M tessellating a plane ${\mathbb R}^2$ has path metric quasi-isometric to the Euclidean metric on the plane if and only if M has only finitely many non-flat vertices and faces.

Malka Schaps (Bar-Ilan University)

Title: *Morita equivalence for non-principal blocks with normal abelian defect group*

Abstract: Using the identification of the quiver of a block with normal defect group with a directed graph computed from the decomposition of rows of the

character table, we show how deformations of the commutativity relations can be used to determine Morita equivalence.

Michael Schein (Bar-Ilan University)

Title: *Pro-isomorphic subgroup growth and base extension*

Abstract: Let G be a finitely generated nilpotent group. A subgroup H of G is called pro-isomorphic if its profinite completion is isomorphic to that of G. The zeta functions enumerating the pro-isomorphic subgroups of G may be expressed in terms of certain p-adic integrals. Now let G = R(Z) be the group of Z-points of a group scheme R defined over Z. We study the pro-isomorphic zeta functions of R(O_K), as K varies over number fields. The key tool is a result controlling the groups of k-automorphisms of $L \otimes_k K$ in certain cases, where L is a finite-dimensional k-Lie algebra and K/k is a finite extension.

Yoav Segev (Ben Gurion University)

Title: *From idempotents in commutative nonassociative algebras to Miyamoto involutions and the group they generate.*

Abstract: The second degree piece $V^\natural_2$ of the Monster vertex operator algebra $V^\natural$ has the structure of a commutative non-associative algebra. Within this algebra certain idempotents, called axes by Conway, give rise to $V^\natural$ and $V^\natural_2$ automorphisms of order two, and those generate the Monster group.

Miyamoto observed that this is a special case of a more general phenomenon. He called the commutative algebras V_2 of the appropriate VOAs V Griess algebras.
Ivanov took certain of the properties of these as axioms for his Majorana algebras. The axial algebras are a further abstraction, with the corresponding automorphisms of order two being called Miyamoto involutions.

We will discuss axial algebras and Miyamoto involutions and related topics. This combines joint works with J. Hall, S. Shpectorov,
and later L. Rowen.

Zlil Sela (The Hebrew University of Jerusalem)

Title: *Word Equations*

Abstract: We combine techniques from geometric groups theory and from low dimensional topology to study sets of solutions to systems of equations (verieties) over a free
semigroup.

Vladimir Shpilrain (The City College of New York)

Title: *Algorithmic problems in groups of matrices*.

Mark Shusterman (Tel Aviv University)

Title: Howson's Theorem for (profinite) Surface Groups

Abstract: A classical result of Howson says that the intersection of two finitely generated subgroups of a free group is finitely generated.

This result has been generalized to surface groups, limit groups, and established in many other cases as well.

Furthermore, the problem of bounding the number of generators of the intersection received much attention.

I will prove Howson's theorem for a large family of pro-p groups (including Galois groups of various arithmetic field extensions and pro-p completions of surface groups) and show how that this gives bounds on the number of generator of the intersection in discrete groups (such as Fuchsian groups).

This is a joint work with Pavel Zalesskii.

Robert Shwartz (Ariel University)

Title: *Signed Hultman numbers, and generalized commuting probability in finite groups.*