A Mathematical Celebration of the Career of Howard Smith

May 13-14, 2013

Bucknell University

Schedule for Monday, May 13

All talks will be delivered in Olin Science, 372.

8:30am-9:15am	Breakfast served in the faculty lounge
9:15am-9:30am	Opening remarks by Associate Provost James Rice
9:30am-10:30am	Martin J. Evans, *Omissible extensions of certain locally finite linear groups*
10:30am-11:00am	Tea and coffee served in the faculty lounge
11:00am-noon	Eamonn O'Brien, *Algorithms for linear groups defined over infinite domains*
noon-2:30pm	Lunch break
2:30pm-3:30pm	Kim Ruane, *Automorphism Groups and Geometric Group Theory*
3:30pm-4:00pm	Tea and coffee served in the faculty lounge
4:00pm-5:00pm	Patrizia Longobardi, *Some results on products of finite subsets in groups*
7:00pm-9:30pm	Conference banquet at Temperance House

Schedule for Tuesday, May 14

All talks will be delivered in Olin Science, 372.

8:30am-9:30am	Breakfast served in the faculty lounge
9:30am-10:30am	Martyn Dixon, *Groups with subgroups of certain types*
10:30am-11:00am	Tea and coffee served in the faculty lounge
11:00am-noon	Ted Hurley, *Algebra in communications*
noon-2:30pm	Lunch break
2:30pm-3:30pm	Mercede Maj, *Recent results on groups with few isomorphism classes of derived subgroups*
3:30pm-4:00pm	Tea and coffee served in the faculty lounge
4:00pm-5:00pm	Giovanni Cutolo, *Groups with restricted outer automizers*
5:00pm-5:15pm	Closing remarks by Ueli Daepp

Abstracts

Giovanni Cutolo

(The University of Naples, Federico II)

Groups with restricted outer automizers

Let G be a group and H a subgroup of G. The *outer automizer* of H in G is the factor $\mathrm{Out}_G H = N_G(H)/HC_G(H)$. Thus, up to isomorphisms, $\mathrm{Out}_G H$ can roughly be described as the group of all outer automorphisms induced on H by elements of G. Constraining outer automizers of subgroups of G can yield strong information on the structure of G: a very well known instance of this kind of result is the Frobenius p-nilpotency criterion for (locally) finite groups.
As the title suggests, this talk will discuss some group classes defined by the imposition of conditions on the outer automizers of subgroups. Some of the results presented have been obtained jointly with M.R. Celentani and A. Leone.

Martyn Dixon

(The University of Alabama)

Groups with subgroups of certain types

This talk will be a survey of results concerning groups with all subgroups subnormal, permutable, ascendant or nilpotent, soluble, or of finite rank and combinations of such properties. It will feature a lot of well-known material and also some more recent material.

Martin J. Evans

(The University of Alabama)

Omissible extensions of certain locally finite linear groups

A normal subgroup N of a group G is said to be an *omissible* subgroup of G if it has the following property: whenever $X \leq G$ is such that $G = XN$, then $G = X$. Accordingly, we say that G is an omissible extension of H if there exists an omissible subgroup N of G such that $G/N \cong H$.
In this talk we'll investigate the possibility of constructing omissible extensions of various locally finite linear groups in non-trivial ways.

Ted Hurley

(NUI, Galway)

Algebra in communications

Why are abstract algebraic systems so important in the communications' areas? Which algebraic methods are involved? The talk will try to answer these questions using examples from various abstract algebraic systems.

Patrizia Longobardi

(The University of Salerno)

Some results on products of finite subsets in groups

If X, Y are subsets of a group G, we write

$$XY = \{xy \mid x \in X, y \in Y\} \text{ and } X^2 = \{x_1x_2 \mid x_1, x_2 \in X\}.$$

We are interested in two problems concerning products of finite subsets in groups. First we investigate the size of X^2, where X is a finite subset of a group G. A finite subset X of a group G is said to satisfy the small doubling property if

$$X^2 \leq \alpha|X| + \beta,$$

where α and β denote real numbers, $\alpha > 1$. We consider finite subsets of **ordered groups**, satisfying the small doubling property with $\alpha = 3$ and small $|\beta|$'s.

Our second problem deals with the size of products XY of two finite subsets X, Y of a group G. We investigate the relation between $|XY|$ and $|YX|$, in particular when $Y = X^{-1}$. We say that G is in $\mathcal{P}$ if

$$|XX^{-1}| = |X^{-1}X|,$$

for any finite subset X of G. We classified all $\mathcal{P}$-groups, they are either abelian, or Hamiltonian 2-groups, or seven fixed finite groups of order at most 20.

References

[1] G.A. Freiman, M. Herzog, P. Longobardi and M. Maj, *Small doubling in ordered groups*, J. Australian Math. Soc., to appear.

[2] G.A. Freiman, M. Herzog, P. Longobardi, M. Maj and Y.V. Stanchescu, *Small doubling in ordered nilpotent groups of class 2*, to appear.

[3] M. Herzog, G. Kaplan, P. Longobardi and M. Maj, *Products of subsets of groups by their inverses*, Beiträge zur Algebra und Geometrie, to appear.

Mercede Maj

(The University of Salerno)

Recent results on groups with few isomorphism classes of derived subgroups

Let G be a group. By a derived subgroup in G is meant the commutator subgroup $H$of a subgroup H of G. We denote by $\mathfrak{C}(G)$ the set of derived subgroups in the group G. It is a natural question as to how important the subset $\mathfrak{C}(G)$ is within the lattice $\mathfrak{S}(G)$ of all subgroups of G. Recently there has been interest in imposing conditions on the set $\mathfrak{C}(G)$ and investigating the resulting effect on the structure of G. For example, in [1] and in [2], F. de Giovanni and D.J.S. Robinson, and M. Herzog, P. Longobardi and M. Maj studied groups G with $\mathfrak{C}(G)$ finite; among other results they proved that if G is a locally graded group, then $\mathfrak{C}(G)$ is finite if and only if the derived subgroup G of G is finite. Here a group G is said to be locally graded if every finitely generated non-trivial subgroup of G contains a proper subgroup of finite index.

We investigate groups which have at most n isomorphism classes of derived subgroups, for a positive integer n ($\mathfrak{D}_n$–groups). We report some general results on some classes of $\mathfrak{D}_n$–groups and we present a characterization of locally graded and periodic $\mathfrak{D}$-groups, where $\mathfrak{D} = \cup_{n\in\mathbb{N}} \mathfrak{D}_n$. Then we concentrate on $\mathfrak{D}_2$ and we report some recent results obtained together with P. Longobardi, D.J.S. Robinson and H. Smith in [3]. Results on locally finite $\mathfrak{D}_3$-groups are also illustrated.

References

[1] F. de Giovanni and D.J.S. Robinson, *Groups with finitely many derived subgroups*, J. London Math. Soc. (2) 71 (2005), 658-668.

[2] M. Herzog, P. Longobardi and M. Maj, *On the number of commutators in groups*, Ischia Group Theory 2004, Contemp. Math. 402, Amer. Math. Soc, Providence, RI (2006), 181-192.

[3] P. Longobardi, M. Maj, D.J.S. Robinson and H. Smith, *On groups with two isomorphism classes of derived subgroups*, Glasgow Math. J, to appear.

Eamonn O'Brien

(The University of Auckland)

Algorithms for linear groups defined over infinite domains

The development of algorithms for the study of finitely generated linear groups defined over infinite domains is still in its infancy. Recent progress includes the first practical algorithms to construct congruence homomorphisms over a broad range of infinite fields and to decide the Tits alternative. We will discuss the general approach which relies heavily on the success of a similar project for groups defined over finite fields. This is a report on ongoing joint work with Detinko and Flannery.

Kim Ruane

(Tufts University)

Automorphism Groups and Geometric Group Theory

In this talk I will discuss recent work with A. Piggott et.al. about automorphism groups of graph products of abelian groups. There has been extensive study of the automorphism groups of free groups and more recently, of right-angled Artin groups (which are graph products of infinite cyclic groups). Our study includes automorphisms of right-angled Coxeter groups which are quite different from the two classes already mentioned. I would like to convince you that the automorphism groups of right-angled Coxeter groups (and more generally, of graph products of finite abelian groups) are interesting and worthy of investigation via Geometric Group Theory.

Acknowledgements

The organizers would like to thank: the Office of the Dean of the College of Arts and Sciences for its financial support of this conference; the speakers who have travelled so far for the occasion; Polly Doyle for arranging accommodations, reimbursements, and many other details; and the many other people whose time and professional efforts have made this event possible.