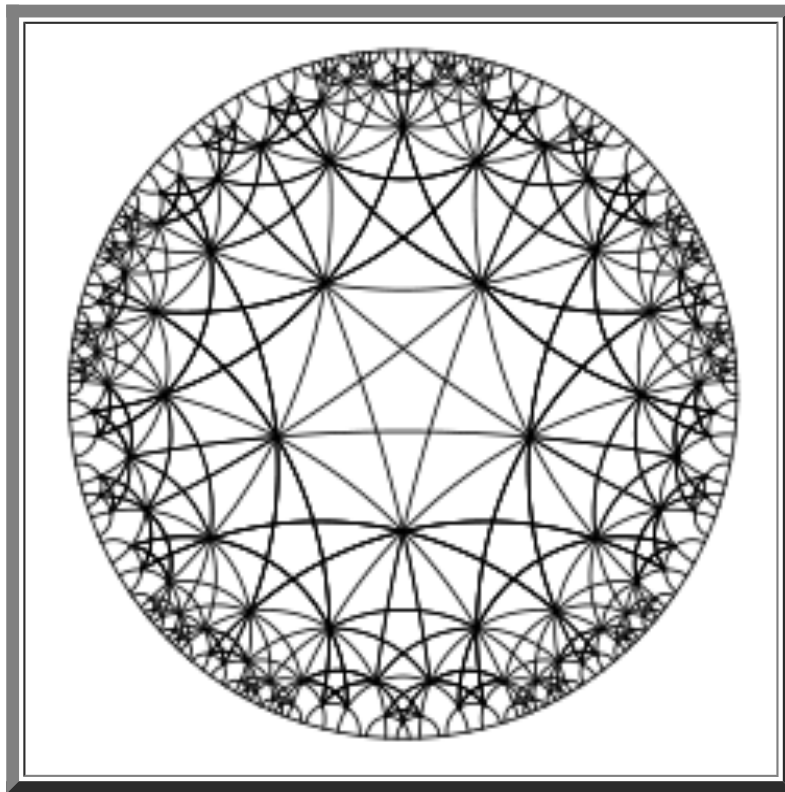


USNA Mathematics Department

**GROUP THEORY DAY
Conference**

Friday January 22, 2010



All talks are to be held in Chauvenet Hall.

Room: seminar room

Professor Bob Gilman

Stevens Institute

Title:

Group-Theoretic Cryptology

Time: 10am

Abstract:

An interesting recent development in group theory is the emergence of cryptosystems based on computational properties of groups of various types. We survey this area and discuss various proposed group-theoretic cryptoprimitives.

Professor Ben Fine

Fairfield Univ.

Time: 11am

Title:

Something for Nothing: Some Consequences of the Solution to the Tarski Problem

Abstract:

From the positive solution to the Tarski problems by Kharlampovich and Myasnikov it follows that every first order theorem true in a nonabelian free group is true in every elementary free group. An elementary free group is a group that shares the same first order theory of the class of nonabelian free groups. The class of elementary free groups extends beyond the class of free groups. In particular orientable surface groups of genus $g \geq 2$ are elementary free. In particular Magnus' theorem concerning

the normal closures of elements in free groups is true in surface groups. This was proved directly by J. Howie and independently by O. Bogopolski in a quite difficult manner. This type of result opens up several different types of questions. The first is which additional nontrivial free group results are true in surface groups but difficult to obtain directly. Secondly what first order properties of nonabelian free groups are true beyond the class of elementary free groups. In regard to this second question we consider groups satisfying certain quadratic properties that we call Lyndon properties and show that the class of groups satisfying these are closed under many amalgam constructions. As a consequence we introduce a class of groups defined in terms of conjugacy pinched constructions that generalize both fully residually free groups and groups acting freely on \mathbb{Z}_n -trees. This class is also tied to a general approach to studying one-relator groups called plainarity introduced by Baumslag, Fine and Rosenberger.

Professor Alexei Miasnikov

Stevens Institute, and McGill Univ

Time: 2pm

Title:

Limits of groups and Krull dimension

Abstract: The Gromov-Hausdorff topology provide a very efficient way to measure similarity of finitely generated groups. Thus limits of free groups are, obviously, "free-like" groups, while limits of finite groups are "approximately finite" groups, etc. It turns out that this geometric similarity (on the level of the Cayley graphs) can be expressed also in model-theoretic terms (in the language of universal sentences), as well as in the language of algebraic geometry (via the coordinate groups of irreducible varieties). In this talk I am going to discuss how such numerical invariants as Krull dimension, Zariski dimension, and Cantor-Bendixon rank are closely related to each other for limit groups.

Professor Dennis Spellman

Temple Univ.

Time: 3pm

Title:

Properties of Nilpotent Groups

Abstract: We introduce a class of groups called weak property R groups. This class properly contains the class of nilpotent groups. Among other things we prove that in torsion free weak property R groups root extractions, when possible, are unique. Along the way we meet property R, property S and a pair of apparently weaker analogues of property S.

There are plans for a lunch with the speakers noon Friday, January 22nd. Time and place to be announced. Please email Tony Gaglione if you are interested. (amg@usna.edu)

Email questions about the conference to:

[Tony Gaglione](#) or [David Joyner](#)

Last updated 2010-01-19 by wdj@usna.edu