



Berlin
Mathematical
School

BMS Friday Colloquium

Friday 2 December 2011 at 14:15

Tea before the lecture begins at 13:00

BMS Loft, Urania, An der Urania 17, 10787 Berlin

Igor Rivin

(Temple University)

Probability, Geometry and Algorithms of Matrix Groups

Igor Rivin will start with about the simplest situation imaginable: Consider a collection C of invertible matrices (you can assume the entries are integers), and consider the group $G(C)$ they generate. In this talk he will discuss some naive (and not so naive) questions one could ask about $G(C)$, and the sort of answers one might get, or hope to get. Here is a selection of the questions:

1. What is $G(C)$ as an abstract group?
2. How does $G(C)$ sit in the ambient matrix group? For example, if all we know is that the matrices are 3×3 invertible matrices with integer entries, the natural candidates for the ambient group are $SL(3, \mathbb{Z})$ or $SL(3, \mathbb{R})$.
3. What can we say about the generic element of $G(C)$? For example, what do its eigenvalues look like? What can we say about its characteristic polynomial?

It turns out that all of the questions above are intimately connected to central questions in number theory, group theory, probability theory, combinatorics, and, not least, geometry. A lot of the techniques have been developed only in the last few years, and our understanding is still quite limited. Igor Rivin will give a (very subjective) snapshot of what he knows, and what sort of techniques are being used.

Igor Rivin is Professor of Mathematics at Temple University. His contributions include solutions of long-outstanding problems in geometry, probability theory, combinatorics, dynamics, and other fields. From September to December 2011, Igor Rivin holds the BMS Professorship.