

COLLOQUIUM

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The smallest number of generators and densities of
generating sets of an algebra finite over the integers

[ABSTRACT]

Let A be a ring whose additive group is free Abelian of finite rank. The topic of this talk is the following question: what is the probability that several random elements of A generate it as a ring? After making this question precise we will see that the answer which can be interpreted as a local-global principle. Some applications will be discussed, for example:

1. What is the smallest number of generators of the direct product of 769 copies of the ring of integral 3-by-3 matrices? (Answer: 3; it is 2 for the product of 768 copies though).
2. What is the probability that 2 random 3-by-3 matrices generate the ring of integral 3-by-3 matrices: (Answer: $\frac{1}{\zeta(2)^2\zeta(3)}$, where $\zeta(s)$ is the Riemann zeta function).

This talk will be based on my joint work with Rostyslav Kravchenko (University of Texas at Austin) and Marcin Mazur (Binghamton University).