Algebra and Number Theory Day

April 30, 2019

Titles and abstracts

Eli Aljadeff (Technion)

Title: *On some computational aspects of PI theory for associative algebras*

Abstract: Recall that an associative algebra A over a field F is PI if it satisfies a nontrivial polynomial identity, that is, there exists a nontrivial element $p(x_1, \dots, x_n) \in F\langle X\rangle$ (the free algebra on a countable set X) which vanishes upon every evaluation on A (e.g. any commutative algebra satisfies the identity $[x, y] = xy - yx$ and so is PI).

Over the years one could identify two main aspects of PI theory.

(1) Structure theorems which study the properties of algebras satisfying some PI.
(2) Computational aspects (our main interest in this lecture) which studies the identities satisfied by a given algebra or more generally by a family of algebras.

In this lecture I'll recall the main concepts and terminology, review some of the main results for algebras over fields of characteristic zero and finally explain classical and more recent results (jointly with Karasik and Jenssens) in the so called *asymptotic theory*. This is the theory which intends to count in asymptotic terms how many polynomial identities (or nonidentities rather)

an algebra has.

Alexei Entin (Tel Aviv University)

Title: *Factorization statistics for restricted polynomial specializations over large finite fields*

Abstract: For a polynomial F(t,A_1,...,A_n) in **F**_p[t,A_1,...,A_n] (p being a prime number) we study the factorization statistics of its specializations F(t,a_1,...,a_n) in **F**_p[t] with (a_1,...,a_n) in S, where S in F_p^n is a subset, in the limit p -> infinity and deg(F) fixed. We show that for a sufficiently large and regular subset S C **F**_p^n, e.g. a product of n intervals of length H_1,...,H_n with H_1...H_n>p^{n-1/2+epsilon} the factorization statistics is the same as for unrestricted specializations (i.e. S=**F**_p^n) up to a small error.

This is a generalization of the well-known Polya-Vinogradov estimate of the number of quadratic residues modulo p in an interval.

Danny Krashen (Rutgers University)

Title: *Local global principles for torsors over semiglobal fields*

Abstract: Given a semiglobal field -- that is, a one variable function field over a complete discretely valued field, and a linear algebraic groupover this field, we are interested to know when local-global principles hold for torsors over the group. In this talk I will describe recent joint work with Colliot-Thélène, Harbater, Hartmann, Parimala and Suresh in which we connect this question in certain cases to questions of R-equivalence for the group, and in some cases are able to give finiteness results and combinatorial descriptions for the obstruction to local-global principles.