Amitsur Symposium 2017

Bar Ilan University, June 28th 2017

Abstracts (by order of lectures)

- **Amitai Regev** (Weizmann) "Growth for the central polynomials"

  Abstract: We study the growth of the multi-linear central polynomials for the infinite dimensional Grassmann algebra G, and for the algebra of the k x k matrices, both over a field of characteristic zero. We also review some new results by Giambruno and Zaicev.

- **Amiram Braun** (Haifa) "On Humphreys' blocks parametrization conjecture"

  Abstract: Let G be a connected , semi simple , simply connected algebraic group over a field of prime characteristic p , and g =Lie(G) its Lie algebra. We shall explain this 1998 conjecture about the blocks of its enveloping algebra U(g) ,the previously known cases (K.Brown and I.Gordon in 2001) and indicate our solution in case p is "good for G". In particular we shall discuss the new results about the center of U(g) which are crucial in the proof.

- **Miriam Cohen** (Ben Gurion U) "The role of left coideal subalgebra in the structure theory of Hopf algebras"

  Abstract: Left coideal sublagebras are the appropriate analogue in Hopf algebras of subgroups in groups. We discuss their role in Hopf quotients and hence in intrinsic definitions of nilpotency and solvability of Hopf algebras. We'll show how they give rise to Harmonic analysis for Hopf algebras.

- **Jack Sonn** (The Technion) "Quadratic residues, difference sets and Hasse's norm theorem"

  Abstract: Given a prime p, does there exist a subset A of the finite field Fp such that every nonzero quadratic residue modulo p has exactly one representation in the form a"-a' with a",a' in A, and no quadratic non-residue has such representations? We give a number of necessary conditions for this to happen and use them to show that in the range $13 < p < 10^{20}$, there are no primes with the property in question. In the talk we focus on one of the necessary conditions whose proof was discovered by applying Hasse's norm theorem. (Joint work with Seva Lev.)

- **Alexander Merkurjev** (UCLA) "Rationality problem for classifying spaces of algebraic groups"

  Abstract: Many classical objects in algebra such as simple algebras, quadratic forms, algebras with involutions, Cayley algebras etc, can be studied by means of principal homogeneous spaces of linear algebraic groups. Each type of algebraic objects is given by points of the classifying space of an algebraic group. The rationality property for the classifying space yields description of objects by means of algebraically independent parameters. In the talk we will discuss the rationality property of classifying spaces of

various algebraic groups.

- **Claudio Procesi** (Universita Di Roma) "Variations on standard identities"

  Abstract: The standard polynomial of degree h is up to a scalar the unique multilinear antisymmetric element of degree h in the free algebra.¡br¿When evaluated in an algebra this gives rise to a polynomial map equivariant under the automorphism group. We will investigate a class of problems related to this more general construction.

- **Eva Bayer** (EPFL, Lausanne) "Hasse principle for multinorm equations"

  Abstract: A classical result of Hasse states that the norm principle holds for finite cyclic extensions of global fields, in other words local norms are global norms. We investigate the norm principle for finite dimensional commutative étale algebras over global fields; since such an algebra is a product of separable extensions, this is often called the multinorm principle. Under the assumption that the étale algebra contains a cyclic factor, we give a necessary and sufficient condition for the Hasse principle to hold. (Joint work with Tingyu Lee and Raman Parimala.)

- **Jean-Pierre Tignol** (UC de Louvain) "Around Rowen's crossed product theorem"

  Abstract: In 1978, Louis proved that every division algebra with involution of degree 8 is an elementary abelian crossed product. This talk will present a conceptual proof and discuss some consequences for the construction of invariants of symplectic involutions on central simple algebras of degree 8. (Joint work with Karim Becher and Nicolas Grenier-Boley.)