Leibniz Universität Hannover

Oberseminar zur Algebra und Algebraischen Kombinatorik

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On the Loewy length of fixed point algebras $A(q,n,e)$ and minimal q-adic digit sums

Let F be an arbitrary field, and let q,n,e be positive integers such that $q>1$ and e divides q^n-1. We define the F-algebra $A(q,n,e)$ as the subalgebra of the truncated polynomial algebra $F[X_1,\dots,X_n]/(X_1^q,\dots,X_n^q)$ with F-basis $\{X_1^{i_1}\cdots X_n^{i_n}+(X_1^q,\dots,X_n^q) \mid 0\le i_j<q, e \mid i_1+i_2q+\cdots+i_nq^{n-1}\}$. In this talk, we consider the relation between the Loewy length of the algebras $A(q,n,e)$ and the minimal number m with the property that e divides a sum of m powers of q.

A motivation to study these algebras comes from the theory of blocks with abelian defect groups. B. Külshammer and B. Sambale proved that the center of a p-block B with abelian defect group D has the same Loewy length as the fixed point algebra $(FD)^I$, provided that the inertial quotient I of B (a p'-subgroup of $\mathrm{Aut}(D)$) acts semiregularly on $[D,I]\setminus\{1\}$.

When P is an elementary abelian group of order p^n, H is a subgroup of order e in a Singer subgroup of $\mathrm{Aut}(P)$, and F is an algebraically closed field of characteristic p, then the fixed point algebra $(FP)^H$ is isomorphic to $A(p,n,e)$.

This is joint work with B. Külshammer, T. Breuer, and L. Héthelyi.

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ab 14:15 Uhr, Raum a410

Hauptgebäude der Leibniz Universität Hannover

Alle Interessierten sind herzlich eingeladen.

Institut fr Algebra, Zahlentheorie und Diskrete Mathematik