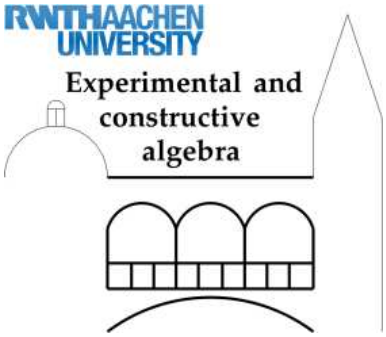
Graduiertenkolleg

Experimentelle und konstruktive Algebra



Kolloquiumsvortrag

Dienstag, 12. November 2013, 14:15 Uhr, Hörsaal klPhys

Ivan Shestakov (Universidade de São Paulo, Brasilien; Sobolev Institute of Mathematics, Novosibirsk, Russland; Max-Plank Institut, Bonn):
Tame and wild automorphisms of polynomials

The polynomials are the most old objects studied in algebra. Nevertheless, the structure of the ring of polynomials, its subrings, derivations and automorphisms has many open problems.

In this talk, we will speak on the automorphisms of polynomials. Let $A_n = F[x_1, ..., x_n]$ be a ring of polynomials over a field F on the variables $x_1, ..., x_n$. An automorphism of A_n is a bijective F-linear mapping $\phi : A_n \to A_n$ such that for any $f, g \in A_n$ holds

$$\phi(fg) = \phi(f)\phi(g).$$

It is clear that the elements $\phi(x_1), ..., \phi(x_n)$ generate again the ring A_n, that is, $A_n = F[\phi(x_1), ..., \phi(x_n)]$. Therefore, the problem of description of automorphisms of A_n is equivalent to the problem of description of all n-tuples of polynomials $f_1, ..., f_n$ which generate A_n. This problem is very important and has various applications in algebra and geometry.

An evident example of automorphism is an application of following type:

$$\phi : (x_1, ..., x_i, ..., x_n) \to (x_1, ..., \alpha x_i + f, ..., x_n),$$

where $0 \neq \alpha \in F$ and the polynomial f does not contain x_i. The automorphisms of this type are called elementary.

In 1942, H.W.E.Jung proved that, in case $n = 2$, any automorphism of $A_2 = F[x, y]$ can be obtained as a composition of elementary automorphisms. But the similar problem for $n \geq 3$ remained open.

In 1972, M.Nagata constructed an automorphism of the ring A_3 for which he conjectured the impossibility to be composed by elementary automorphisms.

In 2004, I.Shestakov and U.Umirbaev confirmed the Nagata conjecture.

In our talk, we will present some ideas and methods of the proof of this conjecture, as well as to speak on other problems and results related with the structure of automorphisms of polynomials, including the famous Jacobian Conjecture.

Wir laden alle Interessierten herzlich ein.

Ab 13:30 Uhr gibt es Kaffee und Tee in der Bibliothek des Lehrstuhl D für Mathematik.