Institut f. Analysis und Zahlentheorie

Zahlentheoretisches Kolloquium

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Seminarraum Analysis-Zahlentheorie (NT02008), Kopernikusgasse 24/II

Galois properties of rings of integer-valued polynomials

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Let K be a number field with ring of integers O_K. Recently, Loper and Werner introduced the following ring which generalizes the classical definition of ring of integer-valued polynomials: $\mathrm{Int}_{\mathbb{Q}}(O_K) = \{f \in \mathbb{Q}[X] \mid f(O_K) \subseteq O_K\}$. If $K = \mathbb{Q}$ then we get the classical ring $\mathrm{Int}(\mathbb{Z})$ of polynomials with rational coefficients mapping $\mathbb{Z}$ into $\mathbb{Z}$. Loper and Werner prove that $\mathrm{Int}_{\mathbb{Q}}(O_K)$ is a Pr"ufer domain, which is stricly contained in $\mathrm{Int}(\mathbb{Z})$ if K is a proper extension of $\mathbb{Q}$. Here, we show that in case K, K' are Galois extensions of $\mathbb{Q}$, then $\mathrm{Int}_{\mathbb{Q}}(O_K) = \mathrm{Int}_{\mathbb{Q}}(O_{K'})$ if and only if $K = K'$. We also characterize a basis for $\mathrm{Int}_{\mathbb{Q}}(O_K)$ as a $\mathbb{Z}$-module when $K/\mathbb{Q}$ is a tamely ramified Galois extension. This is a joint work with Bahar Heidaryan and Matteo Longo.

We also give the following new generalization: for any number fields K, K', if $\mathrm{Int}_{\mathbb{Q}}(O_K) = \mathrm{Int}_{\mathbb{Q}}(O_{K'})$, then K, K' are conjugated over $\mathbb{Q}$.

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