Inverse problems for universal deformation rings of group representations

Dorobisz, Krzysztof

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Krzysztof Dorobisz

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Promotor

prof. dr. P. Stevenhagen

Copromotores

dr. B. de Smit
dr. F. Andreatta (Università degli Studi di Milano)

Overige leden

prof. dr. H.W. Lenstra, Jr.
prof. dr. T. Chinburg (University of Pennsylvania)
prof. dr. B. Edixhoven
dr. J. Byszewski (Uniwersytet Jagielloński)

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Contents

Basic notation and conventions

All considered commutative rings are assumed to have an identity element. The morphisms between them are required to preserve the identity elements.

Given a positive integer n, we will denote by $[n]$ the set $\{1, 2, \ldots, n\}$.

For a positive integer n and an abelian group A the additive group of $n \times n$ matrices over A will be denoted by $M_n(A)$. We adopt the convention of writing $M(i, j)$ for the (i, j)-entry of $M \in M_n(A)$.

We reserve the symbol I_n for the $n \times n$ identity matrix. Given $i, j \in [n]$ we denote by e_{ij} the $n \times n$ matrix having only one non-zero entry, which is 1 at the (i, j)-th place.

Let F, G be functors between categories $\mathcal{D}$ and $\mathcal{E}$. If $\Phi : F \to G$ is a natural transformation then for $A \in \mathrm{Ob}(\mathcal{D})$ we denote the induced map $F(A) \to G(A)$ by Φ_A. Moreover, in case $\mathcal{E} = \mathrm{Sets}$ we say that Φ is injective (surjective) if and only if Φ_A is injective (surjective) for every $A \in \mathrm{Ob}(\mathcal{D})$.

If G, H are topological groups then $\mathrm{CHom}(G, H) := \{f \in \mathrm{Hom}(G, H) \mid f \text{ continuous}\}$.