MONODROMY OF SUBREPRESENTATIONS AND IRREDUCIBILITY OF LOW DEGREE AUTOMORPHIC GALOIS REPRESENTATIONS

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ABSTRACT. Given a compatible system $\{\rho_\lambda : \mathrm{Gal}_K \to \mathrm{GL}_n(E_\lambda)\}_\lambda$ of semisimple λ-adic representations of a number field K satisfying mild local conditions, we prove that for almost all λ any type A irreducible subrepresentation of $\rho_\lambda \otimes \overline{\mathbb{Q}}_\ell$ is residually irreducible. We apply this result and some potential automorphy theorem to prove that $\rho_\lambda \otimes \overline{\mathbb{Q}}_\ell$ is residually irreducible for almost all λ if the compatible system is attached to a regular algebraic, polarized, cuspidal automorphic representation of $\mathrm{GL}_n(\mathbb{A}_\mathbb{Q})$ and $n \leq 6$.