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Uniformity in Galois Representations

We prove that there exists an integer p_0 such that for any non-CM elliptic curve E over $\mathbb{Q}$ and any prime $p > p_0$ the image of the representation of $\mathrm{Gal}(\bar{\mathbb{Q}}/\mathbb{Q})$ induced by the Galois action on the p-division points of E is not contained in the normalizer of a split Cartan subgroup. This gives a partial answer to an old question of Serre.