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On the Distribution of Frobenius of Weight 2 Eigenforms with Quadratic Coefficient Field

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The coefficients of a modular form without so called inner twists are elements of a certain totally real number field. If this number field is different from $\mathbb{Q}$ then one can study the set of primes p such that the p-th coefficient is a rational number. This set is known to be of density zero. However only conjectural statements exists on its size. Using the latest results on the Sato-Tate conjecture for abelian varieties we obtain a heuristic model for the asymptotic size of this set under reasonable assumptions. More precisely we treat the case of weight 2 eigenforms with quadratic coefficient field without inner twist. Moreover we present numerical data which agrees with our model and the assumptions we made to obtain it.

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