1172-11-314 **Fernando Trejos Suarez*** (fernando.trejos@yale.edu), 367 Elm Street, Apt 104, New Haven, CT 06511, and **Alexandra Hoey** (ahoey@mit.edu), 320 Memorial Dr, Room 527, Cambridge, MA 02139. *An Unconditional Explicit Bound on the Error Term in the Sato-Tate Conjecture.*

Let $f(z) = \sum_{n=1}^{\infty} a_f(n)q^n$ be a holomorphic cuspidal newform with even integral weight $k \geq 2$, level N, trivial nebentypus, and no complex multiplication (CM). For all primes p, we may define $\theta_p \in [0, \pi]$ such that $a_f(p) = 2p^{(k-1)/2} \cos\theta_p$. The Sato-Tate conjecture states that the angles θ_p are equidistributed with respect to the probability measure $\mu_{\mathrm{ST}}(I) = \frac{2}{\pi}\int_I \sin^2\theta \, d\theta$, where $I \subseteq [0, \pi]$. Using recent results on the automorphy of symmetric-power L-functions due to Newton and Thorne, we construct the first unconditional explicit bound on the error term in the Sato-Tate conjecture, which applies when N is squarefree as well as when f corresponds to an elliptic curve with arbitrary conductor. In particular, if $\pi_{f,I}(x) := \#\{p \leq x : p \nmid N, \theta_p \in I\}$, and $\pi(x) := \#\{p \leq x\}$, we show the following bound:

$$\left|\frac{\pi_{f,I}(x)}{\pi(x)} - \mu_{\mathrm{ST}}(I)\right| \leq 58.1\frac{\log((k-1)N\log x)}{\sqrt{\log x}} \qquad \text{for} \quad x \geq 3.$$

As an application, we give an explicit bound for the number of primes up to x that violate the Atkin-Serre conjecture for f. (Received August 31, 2021)