1106-VQ-2782

Patrick J Dynes* (pdynes@clemson.edu), 110 Cherry Hill Avenue, Goose Creek, SC 29445, and **Brian McDonald** (bmcdon11@u.rochester.edu), **Christina Rapti** (cr9060@bard.edu) and **Steven J Miller** (sjm1@williams.edu). *On a Variant of the Lang-Trotter Conjecture Involving Binomial Elliptic Curve Coefficients.*

Abstract: Let E be an elliptic curve $y^2 = x^3 + ax + b$ with $a, b \in \mathbb{Z}$. On average, we expect $\#E_p \approx p$ with $\#E_p$ the number of solutions $(x, y) \in \mathbb{Z}/p\mathbb{Z}$ to $y^2 \equiv x^3 + ax + b \bmod p$. The fluctuations $a_E(p) = p - \#E_p$ about this expected value bounded in absolute value by $2\sqrt{p}$, and thus $a_E(p) \in (-2\sqrt{p}, 2\sqrt{p})$.

In 1976, Lang and Trotter conjectured an asymptotic formula for $\pi_{E,r}(x)$, the number of primes p up to x for which $a_E(p) = r$ for any fixed r. While this question is well beyond current methods, in 2006, James and Yu developed an asymptotic formula for the density of traces of Frobenius that are kth powers. Their analysis uses Hardy-Littlewood estimates for sums of generating functions of pure powers. A natural extension of their work is to examine polynomials that are not pure k-th powers. For example, we prove how often $a_E(p)$ lies in a given arithmetic progression, or is a triangular number. Doing so requires a delicate analysis of new generating functions on the minor arcs in order to obtain sufficient cancellation; these results are of independent interest for other problems in number theory. (Received September 16, 2014)