1056-11-200 **Maosheng Xiong*** (xiong@math.psu.edu), 210 McAllister BLD, Dept. Mathematics, Eberly College of Science, Penn State University, State College, PA 16802. *The fluctuations in the number of points on a family of curves over a finite field.*

Let p be a prime number, $\mathbb{F}_q$ a finite field of cardinality q with $q \equiv 1 \pmod{p}$. In this paper we study the fluctuations in the number of $\mathbb{F}_q$-points on the curve C_F, namely $\#C_F(\mathbb{F}_q)$, with affine model $C_F : Y^p = F(X)$, where F is drawn at random uniformly from the set of all irreducible polynomials $F \in \mathbb{F}_q[X]$ of degree d. For q fixed and $d \to \infty$, we find that the limiting distribution of $\#C_F(\mathbb{F}_q) - 1 - q$ is that of a sum of q i.i.d. random variables taking the values $-1, p-1$ with probabilities $\left(\frac{p-1}{p}, \frac{1}{p}\right)$ respectively. When both $d, q \to \infty$, we find that $\frac{\#C_F(\mathbb{F}_q)-1-q}{\sqrt{q(p-1)}}$ has a standard Gaussian distribution. (Received August 14, 2009)