

# Expected Value of High Powers of the Trace of Frobenius of Biquadratic Curves over Finite Fields

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The zeta function for a curve  $C$  over a finite field can be related to a unitary matrix  $\Theta_C$ , called the Frobenius. The number of  $\mathbb{F}_{q^n}$ -points is given by  $q^n + 1 - q^{n/2}\text{Tr}(\Theta_C^n)$ . Katz and Sarnak showed that if we fix the genus,  $g$ , and let  $q$  tend to infinity then  $\Theta_C$  is equidistributed amongst the conjugacy classes of  $USp(2g)$ . Rudnick showed that if we fix  $q$  and let the genus,  $g$ , tend to infinity then the expected value of  $\text{Tr}(\Theta_C^n)$  of hyperelliptic curves tends to  $\int_{USp(2g)} \text{Tr}U^n dU$  for  $n < 4g$ .

Recently Bucur et al. showed that the expected value of  $\text{Tr}(\Theta_C^n)$  of cyclic  $\ell$ -covers tends to  $\int_{U(2g)} \text{Tr}U^n dU$  for  $n < 2g/(\ell - 1)$ .

In this talk we discuss what happens in the case of biquadratic curves.