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Amod Agashe* (agashe@math.fsu.edu), Department of Mathematics, Florida State Univ, 208 Love Building, Tallahassee, FL 32312. *Rational torsion in elliptic curves and the cuspidal subgroup.*

Let E be an optimal elliptic curve over the rationals of conductor N , which we may view as an abelian subvariety of the modular Jacobian variety $J_0(N)$. The cuspidal subgroup of $J_0(N)$ is the group of degree zero divisors supported on the cusps of the modular curve $X_0(N)$. It follows from work of Mazur that if N is prime, then the rational torsion points of E are contained in the cuspidal subgroup, and thus the cuspidal subgroup "explains" the rational torsion in E . Based on some numerical data, we suspect that this may happen more generally even if N is not prime. In this talk, we will show that if N is square free and E has a rational torsion point of prime order r such that r does not divide $6N$, then r divides the order of the cuspidal subgroup. (Received September 03, 2009)