1018-11-98 **Amod Agashe*** (agashe@math.fsu.edu), Department of Mathematics, Florida State University, 208 Love Building, Tallahassee, FL 32306. *Rational torsion of elliptic curves and the cuspidal subgroup.* Preliminary report.

Let E be an optimal elliptic curve over Q of square-free conductor N. It may be viewed as an abelian subvariety of $J_0(N)$, whose points (complex-valued) are degree zero divisors on $X_0(N)$ modulo principal divisors. Let C be the subgroup of $J_0(N)$ supported on the cusps of $X_0(N)$. When N is prime, Emerton (building on work of Mazur) shows that the rational torsion of E is contained in C, i.e., the rational torsion is "explained" by the cuspidal subgroup. We expect that this holds more generally when N is square-free, and will give a partial result in this direction. We will also explain how this is relevant to the second part of the Birch and Swinnerton-Dyer conjecture. (Received March 07, 2006)