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Saikat Biswas* (sbiswas@math.fsu.edu), Department of Mathematics, Florida State University, Tallahassee, FL 32306-4510. *The Tate-Shafarevich Group, Flat Cohomology and Visibility.*

The Tate-Shafarevich group of an elliptic curve is an important invariant and its conjectural finiteness can be used to determine the rank of the elliptic curve. The second part of the Birch and Swinnerton-Dyer conjecture gives a conjectural value for the order of this group in terms of other computable invariants of the elliptic curve. When the conjecture predicts that the group is non-trivial, the theory of visibility, initiated by Cremona and Mazur, can often be used to prove the existence of non-trivial elements in the group. In our talk, we will interpret the Tate-Shafarevich group in terms of flat cohomology and use this interpretation to improve a result of Agashe-Stein that uses the idea of visibility to show the existence of non-trivial elements of the Tate-Shafarevich group. (Received September 22, 2010)