OMER AVCI, University of Ottawa

Torsion of Rational Elliptic Curves over the $\mathbb{Z}_p$-Extensions of Quadratic Fields

Let E be an elliptic curve defined over $\mathbb{Q}$. For a quadratic number field K and an odd prime number p, let L be a $\mathbb{Z}_p$-extension of K. We prove that $E(L)_{\mathsf{tors}} = E(K)_{\mathsf{tors}}$ when $p > 5$. It enables us to classify the groups that can be realized as the torsion subgroup $E(L)_{\mathsf{tors}}$, by using the classification of torsion subgroups over the quadratic fields. We also discuss the exceptional cases when $p = 3$ and $p = 5$.