Heegner Points on Cartan non-split Curves

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The goal is to construct Heegner Points on elliptic curves over $\mathbb{Q}$ in cases where the classical Heegner hypothesis does not hold. Concretely, let $E/\mathbb{Q}$ be an elliptic curve of conductor N , p an odd prime such that p^2 divides N exactly, and K an imaginary quadratic field in which p is inert and the other primes dividing the conductor are split. In this case there aren't any Heegner points in the modular curve $X_0(N)$, but since $sign(E/K) = -1$ we still expect to somehow construct "Heegner points". The idea is to consider other modular curves, the so called Cartan non-split curves, whose Jacobian is isogenous to the new part of $J_0(p^2)$. In order to compute the Abel-Jacobi map we need to compute the Fourier expansions of newforms associated to Cartan non-split groups. These Fourier expansions have coefficients in $\mathbb{Q}(\xi_p)$ and, under a situable normalization, the coefficients satisify nice properties when congujated by elements of $Gal(\mathbb{Q}(\xi_p)/\mathbb{Q})$. This allows us to construct Heegner points for these Cartan groups. We also show many examples of our construction in cases where they generate the Mordell-Weil group, and relate them to the BSD conjecture. This is based on the work done in http://arxiv.org/abs/1403.7801 .

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