# Intersection of CM points with the reducible locus on the Siegel moduli space 

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#### Abstract

Given a primitive quartic CM field, $K$, one can study the values at CM points associated to $K$ of certain Siegel modular functions studied by Igusa. The values are algebraic numbers which generate unramified abelian extensions of the reflex field of $K$. When computing their minimal polynomials over $\mathbf{Q}$, rational primes in the denominators of the coefficients correspond to primes where at least one of the abelian varieties with CM by $K$ reduces to a product of supersingular elliptic curves with the product polarization. We call such primes evil primes for $K$. In joint work with Eyal Goren, we showed that for fixed $K$, such primes are bounded by a quantity related to the discriminant of the field $K$. As a consequence, we showed that certain analogues of elliptic units defined by DeShalit-Goren were actually $S$-units for an explicit set $S$.

In some sense, there are few evil primes, since if we fix $K$, then there are a finite number of evil primes for $K$. But in subsequent work with Goren, we show that evil primes are ubiquitous in the sense that, for any rational prime $p$, there are an infinite number of quartic CM fields $K$ for which $p$ is evil for $K$. This generalizes recent work of Elkies, Ono, and Yang.


