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## 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.