

On some uses of moduli of high-rank K3 surfaces

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Abstract

Explicit computation of some families of K3 surfaces of high Neron-Severi rank yields formulas and CM coordinates for certain Shimura modular curves, new record ranks for elliptic curves over $Q(t)$ and Q , and related applications. Along the way, we notice a new(?) connection between the E9 root system and the typical configuration of reducible fibers of a rational elliptic surface with an N-torsion point (each $N \leq 6$), and likewise between the 19-root system of the even unimodular lattice of signature (17, 1) and the typical configuration of reducible fibers of a K3 elliptic surface with an N-torsion point.