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Constructing hyperelliptic curves of genus 3 whose Jacobians have CM

For cryptographic applications, it is convenient to, given a CM field, be able to construct an abelian variety defined over the complex numbers with complex multiplication by an order in the ring of integers of that field.

It is currently well-understood how to do this in dimension 1, and a lot of progress has been done in dimension 2. We discuss here the challenges of constructing an abelian threefold with complex multiplication by the ring of integers of a sextic CM field and the work that has been done recently in this direction.