On the Paramodular Conjecture
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After reviewing modularity for abelian surfaces, we’ll focus on two results:

i) Serre’s “quartic method” of 1984, used to check modularity of some elliptic curves, is adapted to do the same for abelian surfaces $A$ of prime conductor with $A[2]$ irreducible.

ii) (with Ken Kramer) If, in addition, $A[2]$ is biconnected over $\mathbb{Z}_2$, we give a criterion for the uniqueness of the isogeny class of $A$.

Both apply, in particular, to the smallest case, namely $p = 277$. 