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# FAMILIES OF CURVES WITH NONTRIVIAL ENDOMORPHISMS IN THEIR JACOBIANS

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ABSTRACT. Let $X$ be a projective smooth algebraic curve of genus $g$ defined over a field $k$. The Jacobian variety $\mathrm{Jac}(X)$ is a principally polarized abelian variety of dimension $g$. The set of endomorphisms $\mathrm{End}(\mathrm{Jac}(X))$ is an order in a finite-dimensional semisimple algebra over $\mathbb{Q}$. In this talk, we will mainly concerned with the case $\mathrm{char}(k) = 0$, in which case, the general curve $X$ has $\mathrm{End}(\mathrm{Jac}(X)) = \mathbb{Z}$

We will survey the general problem of constructing curves $X$ with $\mathrm{End}(\mathrm{Jac}(X))$ larger than $\mathbb{Z}$. In general, abelian varieties $A$ with $\mathrm{End}(A)$ containing a ring $R$, and additional data such as polarizations and level structures, form families parametrized by a Shimura variety. We will discuss some general methods for explicitly computing equations for Shimura varieties and their universal families. Some recent work with collaborators Dun Liang, Zhibin Liang, Ryotaro Okazaki, Yukiko Sakai, and Haohao Wang will be described.

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