

NONCONGRUENCE MODULAR FORMS AND THE FUNDAMENTAL GROUPS OF PUNCTURED ELLIPTIC CURVES

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If f is a Hecke eigen-cuspform with \mathbb{Q} -coefficients for congruence subgroup of $SL(2, \mathbb{Z})$, then, famously, to f one may associate an elliptic curve E over \mathbb{Q} such that the Fourier coefficients of f describe the action of the absolute Galois group $\text{Gal}(\overline{\mathbb{Q}}/\mathbb{Q})$ on the Tate module of E . If f is a cusp form for a noncongruence subgroup of $SL(2, \mathbb{Z})$, then we will describe how, using work of Scholl and Katz, the Fourier coefficients of f give information about the action of $\text{Gal}(\overline{\mathbb{Q}}/\mathbb{Q})$ on the (nonabelian) fundamental groups of punctured elliptic curves.