CMI Mathematics Colloquium

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The Eisenstein ideal of weight k and ranks of Hecke algebras

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Let p and ℓ be primes such that $p > 3$ and $p \mid \ell - 1$ and k be an even integer. Using deformation theory of Galois representations, we will give a necessary and sufficient condition for the Z_p-rank of the completion of the Hecke algebra acting on the space of cuspidal modular forms of weight k and level $\Gamma_0(\ell)$ at the maximal Eisenstein ideal containing p to be greater than 1 in terms of vanishing of the cup products of certain global Galois cohomology classes. We will begin with a brief introduction to modular forms.