Séminaire de théorie des nombres

Le 26 mars 2007 à 15h30

The modularity of Calabi–Yau threefolds over Q

Exposé de Noriko Yui (Queen's University,IHES)

Résumé : We will discuss the modularity of Galois representations associated to Calabi–Yau threefolds over **Q**. We can show that any rigid Calabi–Yau threefold over **Q** is modular i.e., its two-dimensional Galois representation comes from a modular form of weight 4 on some some congruence subgroup of $PSL_2(\mathbf{Z})$. However, when a Calabi–Yau threefold is non-rigid, the dimension of the Galois representation gets rather large, and the modularity question poses a serious challenge. We will construct explicit examples of non-rigid Calabi–Yau threefolds fibered over $\mathbf{P}^1$ by non-constant semi-stable $K3$ surfaces and reaching the Arakelov–Yau upper bound. For these examples, we prove that the "interesting" part of their L-series do come from modular forms.