Workshop Calabi-Yau Motives

28.-30.01.2019

Speakers:

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Four-dimensional Galois representations arising from certain Calabi–Yau threefolds

We consider the (irreducible) four-dimensional Galois representations arising from certain Calabi–Yau threefolds over Q with all the Hodge numbers of the third cohomology groups equal to 1. There are many examples of (families) of such Calabi–Yau threefolds. The modularity/automorphy of such Calabi–Yau threefolds will be the main topic of discussion. There are two venues to be considered. In one venue, we ought to count the number of rational points over finite fields of these Calabi–Yau threefolds to concoct their L-series. In the other venue, we ought to construct some modular varieties, in this case, conjecturally, Siegel modular forms of weight 3 and genus 2 on some paramodular subgroups of Sp(4,Z), and then compute their L-series. Such modular forms may be constructed using Borcherds forms. The ultimate aim is to establish a Langlands correspondence between the two L-series, thereby establishing the modularity/automorphy of such Calabi–Yau threefolds. This is a joint work with Yifan Yang (National Taiwan University).