

Yui, Noriko (Queen's University)

Certain families of K3 surfaces and their modularity

Abstract: We start with a double sextic family of K3 surfaces with four parameters with Picard number 16 defined over \mathbb{Q} . Then by geometric reduction (top-to-bottom) processes, we obtain three, two and one parameter families of K3 surfaces of Picard number 17, 18, and 19 respectively. All these families turn out to be of hypergeometric type in the sense that their Picard–Fuch differential equations are given by hypergeometric or Heun functions. We will study the geometry of two parameter families in detail.

We will then prove, after suitable specializations of parameters, these K3 surfaces will have CM (complex multiplication), and will become modular, i.e., the Galois representations of dimensions less than or equal to 6 associated to the transcendental lattices are all induced from 1-dimensional representations. Thus, these K3 surfaces will be determined by modular forms of various weights. This is done starting with one-parameter family and then applying arithmetic induction (bottom-to-top) processes.

Our final goal is to determine explicit modular forms that determine the L -functions of these K3 families at special fibers.

This is a joint work with A. Clingher, S. Kim and A. Malmendier.