# K3 SURFACES AND THEIR AUTOMORPHISM GROUPS

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Given an algebraic variety, an important step to understand the geometry and the properties of the variety is to understand its automorphism group. In this talk I will consider in particular K3 surfaces.

A K3 surface is a compact, complex, simply connected smooth surface with trivial canonical bundle. The most easy example of a K3 surface is the zero set of a homogeneous polynomial of degree four in the 3-dimensional complex projective space, i.e. a quartic in $\mathbb{P}^3$. Kondo in 1999 has shown that the automorphism group of a K3 surface has order at most 3840 and in this case there is only one K3 surface with such an automorphism group. However the study of automorphisms of K3 surfaces started before with works of Nikulin in the 80's.

In my talk, after a short introduction to K3 surfaces, I will study their symplectic and non-symplectic automorphisms, in particular I will describe the fixed locus. Observing that for any K3 surface $X$, the cohomology group $H^2(X, \mathbb{Z})$ is an even unimodular lattice of signature $(3, 19)$, I will show how lattice theory plays an important role in the description of K3 surfaces with non-trivial automorphism group.