$K3$ surfaces with two involutions and low Picard number

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Abstract

For instanton constructions in higher dimensions one sometimes requires a $K3$ surface with two involutions, one holomorphic and one anti-holomorphic, and a stable bundle on it. Checking stability of a bundle becomes hard when there are many line bundles on the surface. This motivates the search for $K3$ surfaces with two involutions and with Picard number as small as possible. I will explain how to find the minimal Picard number for $K3$ surfaces of any degree. An important ingredient in the proof are explicit computer generated examples that realise these minimal Picard numbers and I will explain how they were obtained. I will explain one toy application, reproducing a G_2-instanton on the resolution of $T^3 \times K3/Z_2^2$.