Kodaira dimension of orthogonal modular varieties

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This talk is primarily aimed at graduate students.

In 2007 Gritsenko, Hulek, and Sankaran showed that the coarse moduli space $K_d$ of $K3$ surfaces of degree $d$ is of general type. They did this by constructing enough pluricanonical forms out of a single special modular form for a group associated to the space $K_d$, by leveraging work of Borcherds. In this talk I will review the circle of ideas behind their proof, and explain how one can use these ideas to show that certain moduli spaces parametrizing cubic fourfolds that contain more surfaces than one might expect are also of general type (joint with Sho Tanimoto). Time permitting, I will explain connections of this latter result to the arithmetic of $K3$ surfaces over number fields.