

We describe geometrically the first irreducible components of the Noether-Lefschetz locus in the moduli space of Gushel-Mukai fourfolds. As a consequence, we deduce that their Kodaira dimension is negative. We also construct examples of rational Gushel-Mukai fourfolds, giving more evidence for the analog of the Kuznetsov conjecture for cubic fourfolds: a Gushel-Mukai fourfold is rational if and only if it admits an associated K3 surface. This project started with a collaboration with Michael Hoff and Francesco Russo.