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*Density of rational points on a family of del Pezzo surface of degree 1*

Let  $X$  be an algebraic variety over a number field  $k$ . We want to study the set of  $k$ -rational points  $X(k)$ . For example, is  $X(k)$  empty? If not, is it dense with respect to the Zariski topology? Del Pezzo surfaces are classified by their degrees  $d$ , an integer between 1 and 9. Manin and various authors proved that for all del Pezzo surfaces of degree  $>1$  is dense provided that the surface has a  $k$ -rational point (that lies outside a specific subset of the surface for  $d=2$ ). For  $d=1$ , the del Pezzo surface always has a rational point. However, we don't know if the set of rational points is Zariski-dense. In this talk, I present a result, joint with Rosa Winter, in which we prove the density of rational points for a specific family of del Pezzo surfaces of degree 1 over  $k$ .