The local to global principle for rational points

Let X be a connected smooth projective variety over Q. If X has a Q point, then X must have local points, i.e. points over the reals and over the p-adic completions Q_p. However, local solubility is often not sufficient. Manin showed that quadratic reciprocity together with higher reciprocity laws can obstruct the existence of a Q point (a global point) even when there exist local points. We will give an overview of this obstruction (in the case of quadratic reciprocity) and then show that for certain surfaces, this reciprocity obstruction can be viewed in a geometric manner. More precisely, we will show that for degree 4 del Pezzo surfaces, Manin's obstruction to the existence of a rational point is equivalent to the surface being fibered into genus 1 curves, each of which fail to be locally solvable. This talk will be suitable for a general audience.

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