# $\mathbb{A}^1$-ENUMERATIVE GEOMETRY

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We will discuss how to use $\mathbb{A}^1$-homotopy theory to include arithmetic-geometric information into results from classical enumerative geometry, such as the result that over the complex numbers, there are 27 lines on a smooth cubic surface. Over non-algebraically closed fields, we replace arguments from classical algebraic topology, for example computations of Euler classes, with arguments from $\mathbb{A}^1$-homotopy theory. There has been a lot of recent progress in this direction due to mathematicians including Marc Hoyois, Jesse Kass, Marc Levine, Padmavathi Srinivasan, Matthias Wendt, and the lecturer. These lectures will introduce this recent direction of study. The project will first identify classical enumerative geometry results over $\mathbb{C}$ amenable to such enrichment. We will then choose one to attempt to enrich to a corresponding result giving information over non-algebraically closed fields using these methods.