

ALGEBRA
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*Curve classes on conic bundle threefolds and applications to
rationality*

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Abstract: A variety is k -rational over a field k , if it is birational to projective space over k . From the perspective of rationality, conic bundles are a geometrically rich class of varieties. In this talk, I will discuss the rationality of conic bundle threefolds. The rationality of threefolds is very closely linked to the space of curve classes on them. Indeed, over algebraically closed fields, a rationality criterion for conic bundle threefolds over minimal surfaces has been known since the 80's, due to Shokurov. This criterion is the vanishing of the Intermediate Jacobian obstruction, introduced by Clemens and Griffiths. More recently, Hassett-Tschinkel (over the reals) and Benoist-Wittenberg (over arbitrary fields) introduced a refined obstruction to rationality, namely the Intermediate Jacobian Torsor obstruction. This obstruction has proved to be a powerful tool for threefolds, and its vanishing has been shown to be sufficient for rationality in several cases. In joint work with Sarah Frei, Lena Ji, Bianca Viray and Isabel Vogt, we study curve classes on certain types of conic bundle threefolds over arbitrary fields of odd characteristic. By giving an explicit description of these curve classes, we show that the IJT obstruction is insufficient to characterize rationality.

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