

Combinatorial pencils and Hasse-Witt invariants

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Using a natural combinatorial generalization of the Fermat quartic and the Batyrev mirror symmetry construction, we obtain a collection of K3 surface pencils of generic Picard rank 19 in Gorenstein Fano toric varieties. We characterize point counts on these varieties over finite fields using Picard-Fuchs equations and classical hypergeometric functions. We use similar techniques to study the periods and arithmetic of highly symmetric Calabi-Yau hypersurfaces in Grassmannians. This talk describes joint work with Adriana Salerno and Chenglong Yu.