There are 160,839<1> + 160,650<-1> 3-planes in a 7-dimensional cubic hypersurface

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The expression in the title is a bilinear form and it comes from an Euler number in A1-algebraic topology. This talk will explain applications of A1-algebraic topology to enumerative geometry over fields other than the real or complex numbers. (No knowledge of A1-algebraic topology is assumed.) For example, in joint work with Tom Bachmann, we compute a count of d-dimensional planes contained in a generic complete intersection of polynomials of given degrees, building on joint work with Jesse Kass, and work of Marc Levine. In this count, each d-plane contributes a bilinear form recording information about the plane such as its field of definition. The resulting sum is independent of the particular complete intersection with the degrees of the polynomials fixed, and is valid over any field. The proof is by an integrality result on A1-Euler numbers saying that problems defined over Z[1/2] produce bilinear forms defined over Z[1/2]. The new work in this talk is joint with Tom Bachmann.