



A RANK 6 ALTERNATIVE TO THE PLÜCKER RELATIONS

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Abstract of Talk: The exterior algebra is an algebra of vectors with the operations of addition and 'wedge product' (an anti-commutative, multilinear product). The question of whether an element of this space is 'decomposable' as a product of vectors is analogous to the question of whether an integer is prime or composite. The standard way to answer the question involves the Plücker Relations, a collection of quadric polynomials that the coefficients satisfy if and only if the element is decomposable. Depending on the degree of the wedge product and the dimension of the vectors, you may need to use many very long Plücker Relations to determine decomposability in general. However, mysteriously, a method used frequently in mathematical physics seems to be able to determine decomposability using only a single equation that looks similar to a short Plücker relation. In this project, we provide a mathematical explanation of how that procedure works for the first time. We define a different collection of quadric polynomials which also determine decomposability but, unlike the Plücker relations, are all essentially the same as each other (specifically, they all have rank 6) and can consequently be used simultaneously as is done by the physicists.