Aspects of tensor products over finite fields and Galois geometries

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Tensor products play an important role in both mathematics and physics, with applications in e.g. complexity theory, algebraic statistics, tensor networks in quantum information theory, and representation theory. A good recent reference is the book ”Tensor products: Geometry and Applications”, by J. M. Landsberg [1].

Although there are still many interesting open problems, tensor products are well studied objects. However, most of the research on tensor products (including [1]) only considers tensor products over the complex numbers. Sometimes this is extended to general algebraically closed fields, but almost none consider the case where the ground field is finite.

In this talk, we will focus on tensor products over finite fields, explain the connections with Galois geometries, and survey what is known, including some recent results concerning rank, decomposition and invariant orbits, from [2, 3, 4].

References


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