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**Frank Thorne\***, thorne@math.sc.edu, and **Takashi Taniguchi**. *Levels of distribution for prehomogeneous vector spaces.*

I will describe a family of exponential sums over finite fields which arise in the study of prehomogeneous vector spaces and arithmetic statistics. I will give an overview of how they arise, how they are evaluated, how one can translate them into "level of distribution" estimates, and why one might care.

I will especially focus on describing how the algebraic and geometric structure of these sums leads quite directly to strong results in analytic number theory. (Received September 01, 2016)