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**Harris Ahmed Mohammed Ismail\*** (moham189@umn.edu) and **Steven Sperber** (sperber@umn.edu). *On some applications of a generalized Dwork trace formula to the  $L$ -function associated with exponential sums over Galois rings.* Preliminary report.

We begin with a generalization of the Dwork trace formula which applies to the  $L$ -function associated with certain exponential sums over Galois rings. These are rings of Witt vectors of a finite field having a fixed finite length. The associated  $L$ -function is a generating series encoding information for the corresponding data as one considers finite extensions of the base field. By a character argument, we can apply results to the zeta function which counts solutions to polynomial equations in these Galois rings. In particular, we prove the rationality of the generalized zeta function using the extended trace formula. One can also use Bombieri's argument to obtain bounds on the degree of such  $L$ -functions. There should also be an application to estimating the  $p$ -divisibility of such number counts. (Received September 20, 2016)