

Meeting: 1003, Atlanta, Georgia, SS 14A, AMS Special Session on D-Modules, I

1003-11-1204 **Alan C. Adolphson*** (adolphs@math.okstate.edu), Department of Mathematics, Oklahoma State University, Stillwater, OK 74078, and **Steven Sperber**, School of Mathematics, University of Minnesota, Minneapolis, MN 55455. *Hodge polygons for exponential sums*. Preliminary report.

Let X be a projective variety over a finite field \mathbf{F}_q , f an \mathbf{F}_q -rational function on X , and Ψ a nontrivial additive character on \mathbf{F}_q . Associated to this data is an L -function $L(t)$, which is rational by theorems of Dwork and Grothendieck. In nice situations, $L(t)$ or its reciprocal is a polynomial, all of whose reciprocal roots have absolute value $q^{(\dim X)/2}$. (This was proved by N. Katz, building on fundamental work of P. Deligne.) It is an open problem to find good p -adic estimates for the zeros and poles of $L(t)$, or, equivalently, to find the p -adic Newton polygon of $L(t)$. We discuss the few known results on this question and introduce some new ideas to attempt to tie them together. (Received October 04, 2004)