1102-14-44 **Frédéric Bihan** and **Kaitlyn Phillipson*** (kaitlyn@math.tamu.edu), College Station, TX 77845, and **Erika Refsland**, **Robert Rennie** and **J. Maurice Rojas**. *Linear Forms in Logarithms and Fast Topology Computation for Positive Zero Sets of Sparse Polynomials.*

Let K be any field. Suppose $f \in K[x_1, \ldots, x_n]$ has exactly $n+k$ terms and its set of exponent vectors does not lie in any affine hyperplane. We call f an honest n-variate $(n+k)$-nomial and let Z denote the zero set of f in K^n. The case where $k=1$ and K is a finite field formed the genesis of the Weil Conjectures in 1940.

We study the case $K=\mathbb{R}$ and focus on the complexity of computing the topology of Z. We show that Baker's Theorem on Linear Forms in Logarithms implies that, for $k \leq 2$ and n fixed, the isotopy type of the positive part of Z can be computed in polynomial time. (In particular, this means time polynomial in the log of the degree of f.) This result has many practical implications, including strengthening the known bounds for isotopy types and connected components of positive zero sets of sparse polynomials. We also show that the underlying algorithm can be sped up to complexity polynomial in n if Baker's refinement of the abc-Conjecture is true. As a consequence, we obtain that a particular complexity lower bound in real algebraic geometry presents an obstruction to a strengthening of the abc-Conjecture. (Received July 08, 2014)