1135-05-936 **Alexander Diaz-Lopez*** (diazlopezalexander@gmail.com), 800 Lancaster Ave (SAC 305), Department of Mathematics, Villanova University, Villanova, PA 19085, and **Pamela Harris**, **Erik Insko** and **Mohamed Omar**. *A proof of the peak polynomial positivity conjecture.*

We say that a permutation $\pi = \pi_1\pi_2 \cdots \pi_n \in \mathfrak{S}_n$ has a peak at index i if $\pi_{i-1} < \pi_i > \pi_{i+1}$. Let $\mathcal{P}(\pi)$ denote the set of indices where π has a peak. Given a set S of positive integers, we define $\mathcal{P}(S; n) = \{\pi \in \mathfrak{S}_n : \mathcal{P}(\pi) = S\}$. In 2013 Billey, Burdzy, and Sagan showed that for subsets of positive integers S and sufficiently large n, $|\mathcal{P}(S; n)| = p_S(n)2^{n-|S|-1}$ where $p_S(x)$ is a polynomial depending on S. They gave a recursive formula for $p_S(x)$ involving an alternating sum, and they conjectured that the coefficients of $p_S(x)$ expanded in a binomial coefficient basis centered at $\max(S)$ are all nonnegative. In this talk we introduce a new recursive formula for $|\mathcal{P}(S; n)|$ without alternating sums and we use this recursion to prove that their conjecture is true. (Received September 17, 2017)