1132-05-5 **Alexander Diaz-Lopez** (adiazlo1@swarthmore.edu), **Pamela E. Harris** (peh2@williams.edu), **Erik Insko** (einsko@fgcu.edu) and **Mohamed Omar*** (omar@g.hmc.edu). *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 $\pi$ 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 paper 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 March 10, 2017)