1176-05-280 **Jaume de Dios Pont**, **Rachel Greenfeld**, **Paata Ivanisvili** and **Jose Ramon Madrid Padilla*** (jmadrid@math.ucla.edu). *Additive energies on discrete cubes.*

We prove that for $d \geq 0$ and $k \geq 2$, for any subset A of a discrete cube $\{0,1\}^d$, the $k-$higher energy of A (i.e., the number of $2k-$tuples $(a_1, a_2, \ldots, a_{2k})$ in A^{2k} with $a_1 - a_2 = a_3 - a_4 = \cdots = a_{2k-1} - a_{2k}$) is at most $|A|^{\log_2(2^k+2)}$, and $\log_2(2^k+2)$ is the best possible exponent. We also show that if $d \geq 0$ and $2 \leq k \leq 10$, for any subset A of a discrete cube $\{0,1\}^d$, the $k-$additive energy of A (i.e., the number of $2k-$tuples $(a_1, a_2, \ldots, a_{2k})$ in A^{2k} with $a_1+a_2+\cdots+a_k = a_{k+1}+a_{k+2}+\cdots+a_{2k}$) is at most $|A|^{\log_2 \binom{2k}{k}}$, and $\log_2 \binom{2k}{k}$ is the best possible exponent. We discuss the analogous problems for the sets $\{0,1,\ldots,n\}^d$ for $n \geq 2$. (Received January 25, 2022)