1086-11-1658 **Daniel J Kriz***, 1 Nassau Hall, Princeton, NJ 08544. *On the Maximal Cross Number of Unique Factorization Multisets.*

We study a conjecture of Gao and Wang concerning a proposed formula $K_1^*(G)$ for the maximal cross number $K_1(G)$ occuring among all unique factorization multisets over a given finite abelian group $G$. As a corollary of our first main result, we verify the conjecture for groups of the form $C_{p^m} \oplus C_p, C_{p^m} \oplus C_q, C_{p^m} \oplus C_q^2, C_{p^m} \oplus C_r^n$ where $p, q$ are distinct primes and $r \in \{2,3\}$. In our second main result we verify that $K_1(G) = K_1^*(G)$ for groups of the form $C_r \oplus C_{p^m} \oplus C_p, C_{rp^m q}$ and $C_r \oplus C_p \oplus C_q^2$ for $r \in \{2,3\}$ given some restrictions on $p$ and $q$. We also study general techniques for computing and bounding $K_1(G)$, and derive an asymptotic result which shows that $K_1(G)$ becomes arbitrarily close to $K_1^*(G)$ as the smallest prime dividing $|G|$ goes to infinity, given certain conditions on the structure of $G$. We give new bounds for the cases when $G$ is an arbitrary abelian $p$-group, in particular showing that in the case of $p$-groups, $K_1(G)$ is within $O\left(\frac{\log p}{p}\right)$ of $K_1^*(G)$ for all sufficiently large $p$, and also derive some necessary properties of the structure of unique factorization multisets which would hypothetically violate $k(S) \leq K_1^*(G)$. (Received September 23, 2012)