1068-05-101 **William T. Trotter*** (trotter@math.gatech.edu) and **Noah Streib**. *Antichains in the Product of Chains.* Preliminary report.

For a positive integer w, let $\mathbb{Z}^w$ denote the cartesian product of w copies of the integers. When $A = (a_1, a_2, \ldots, a_w)$ and $B = (b_1, b_2, \ldots, b_w)$ are elements of $\mathbb{Z}^w$, we say that A and B are k-crossing for some positive integer k when there exist distinct integers i and j so that $a_i \geq k + b_i$ and $b_j \geq k + a_j$. Whenever A and B are incomparable, they are 1-crossing.

Now we have the following extremal problem: Find the maximum size $F(k, w)$ of an antichain $\mathcal{F}$ in $\mathbb{Z}^w$ so that no elements of $\mathcal{F}$ are k-crossing. This problem was posed to us by Piotr Micek and he explained the bounds: $k^{w-1} \leq F(k, w) \leq k^w$. For $w = 1$ and $w = 2$, the lower bound is easily seen to be the correct answer, and it is conjectured that the lower bound is always correct. Bartosz Walczak has produced a very clever proof of this conjecture for the case $k = 3$.

In this talk, we discuss several constructions which explain why the lower bound is best possible and suggest lines of attack for the general case of the conjecture.

This is joint work with Bartosz Walczyk and seven other colleagues. (Received January 14, 2011)