

1019-42-44

**Michael T Lacey\***, School of Mathematics, Atlanta, GA 30332, and **Dmitry Bilyk**, School of Mathematics, Atlanta, GA 30332. *New results on Irregularity of Distribution and Discrepancy in Three Dimensions.*

Let  $D_N$  be the discrepancy function associated with a point set in the unit cube in three dimensions. We extend a famous result of Jozef Beck, showing that necessarily one has the inequality

$$\|D_N\|_\infty \gtrsim (\log N)^{1+\eta}.$$

Here,  $\eta > 0$  is an absolute constant. We conjecture that  $\eta = 1/2$  is best possible. Beck's result had  $(\log N)^\eta$  replaced by a term that was doubly logarithmic in  $N$ . The method of proof follows Beck's ingenious 'short Reisz product' method, but we will find many simplifications and extensions of the method. There is a related improvement in the so called Small Ball inequality. (Received July 31, 2006)