1108-41-94   **Jean Bourgain**, **Stephen Dilworth**, **Kevin Ford**, **Sergei Konyagin** and **Denka Kutzarova***
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Urbana-Champaign, Urbana, IL 61801. *Explicit constructions of RIP matrices.*

We give a new explicit construction of $n \times N$ matrices satisfying the Restricted Isometry Property (RIP). Namely, for some $\epsilon > 0$, large N and any n satisfying $N^{1-\epsilon} \leq n \leq N$, we construct RIP matrices of order $k \geq n^{1/2+\epsilon}$ and constant $\delta = n^{-\epsilon}$. This overcomes the natural barrier $k = O(n^{1/2})$ for proofs based on small coherence, which are used in all previous explicit constructions of RIP matrices. Key ingredients in our proof are new estimates for sumsets in product sets and for exponential sums with the products of sets possessing special additive structure. The paper was published in 2011, but it is still the only proof which breaks the square-root bottleneck. (Received January 03, 2015)

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