

Arithmetic progressions in sumsets via probability, geometry and analysis

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We shall use a theorem of probability to prove a geometrical result, which when applied in an analytical context yields an interesting and surprisingly strong result in combinatorics on the existence of long arithmetic progressions in sums of two sets of integers. For the sake of exposition, we might focus on a version of the final result for vector spaces over finite fields: if A is a subset of F_q^n of some fixed size, then how large a subspace must $A + A$ contain?

Joint work with Ernie Croot and Izabella Laba.