COMBINATORICS
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Progressions with a pseudorandom step

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Abstract: An open problem of interest in combinatorial number theory is that of providing a non-ergodic proof to the so called polynomial Szemerdi theorem. So far, the landmark result in this venue is that of Green who considered the emergence of 3-term arithmetic progressions whose gap is a sum of two squares (not both zero) in dense sets of integers.

In view of this we consider the following problem. Given two dense subsets A and S of a finite abelian group G, what is the weakest "pseudorandomness assumption" which, once put on S, implies that A contains a 3-term arithmetic progression whose gap is in S? We answer this question for $G = Z_n$ and $G = F_p^n$. To quantify pseudorandomness we use Gowers norms.

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