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**Polona Durcik** and **Vjekoslav Kovac\*** (vjekovac@math.hr), Department of Mathematics, Faculty of Science, Bijenicka cesta 30, 10000 Zagreb, Croatia. *A Szemerédi-type theorem for subsets of the unit cube.*

We are interested in arithmetic progressions in positive measure subsets of  $[0, 1]^d$ . After a counterexample by Bourgain, it seemed as if nothing could be said about the longest interval formed by sizes of their gaps. However, Cook, Magyar, and Pramanik gave a positive result for 3-term progressions if their gaps are measured in the  $\ell^p$ -norm for  $p \neq 1, 2, \infty$  and the dimension  $d$  is large enough. We establish an appropriate generalization of their result to longer progressions. The main difficulty lies in handling a class of multilinear singular integrals associated with arithmetic progressions that includes the well-known multilinear Hilbert transforms, bounds for which still constitute an open problem. As a substitute, we use the previous work of the authors with Thiele, on power-type cancellation of those transforms, which was, in turn, motivated by a desire to quantify the results of Tao and Zorin-Kranich. The basic outline of our approach is a modification of the one by Cook, Magyar, and Pramanik. It allows us to be sufficiently quantitative and promises useful future applications to related problems. (Received January 20, 2020)