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**Wenbo Sun.** *Optimal lower bounds for multiple recurrence.*

Let  $(X, \mathcal{B}, \mu, T)$  be an ergodic measure preserving system,  $A \in \mathcal{B}$  and  $\epsilon > 0$ . Given functions  $f_1, \dots, f_k : \mathbb{N} \rightarrow \mathbb{Z}$ , under which conditions is the set

$$S := \{n \in \mathbb{N} : \mu(A \cap T^{-f_1(n)}A \cap T^{-f_2(n)}A \cap \dots \cap T^{-f_k(n)}A) > \mu(A)^{k+1} - \epsilon\}$$

large? I will present some new results when the functions  $f_i$  involve the prime numbers, polynomials or functions of the form  $f(n) = \lfloor n^{5/2} \rfloor$ . I will also mention open questions even for the case when all the  $f_i$  are linear. (Received September 25, 2018)