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Product free sets in profinite groups

Inspired by Gowers' seminal paper on quasi-random finite groups, we will discuss quasi-randomness for profinite groups. We will obtain bounds for the minimal degree of non-trivial representations of $SL_k(\mathbb{Z}/(p^n\mathbb{Z})$ and $Sp_{2k}(\mathbb{Z}/(p^n\mathbb{Z})$. Our method also delivers a lower bound for the minimal degree of a faithful representation of these groups. Using the suitable machinery from functional analysis, we establish exponential lower and upper bounds for the supremal measure of a product-free measurable subset of the profinite groups $SL_k(\mathbb{Z}/(p^n\mathbb{Z})$ and $Sp_{2k}(\mathbb{Z}/(p^n\mathbb{Z})$. This is joint work with Keivan Mallahi-Karai.