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Furstenberg Sets Estimates with Application to Restriction Theory

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A Kakeya set is a compact subset of $\mathbb{R}^n$ containing a unit line segment in every direction. More generally, for $0 < s \leq 1$, an s-Furstenberg set is a subset $E \subset \mathbb{R}^n$ such that for every direction there is a unit line segment whose intersection with E has Hausdorff dimension at least s. Furstenberg set problems ask for lower bounds on $\dim_H(E)$ in terms of s and n.

In this talk I will discuss how such dimension estimates arise naturally in Fourier restriction theory via wave packet decompositions. From this perspective it is natural to consider s-dimensional subsets of line segments, rather than whole segments, because waves may concentrate on sparser subsets of tubes.

This is based on joint work with Shukun Wu and joint work in progress with Dima Zakharov.

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