

HARMONIC AND SPECTRAL ANALYSIS

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ϕ -approximate orthogonality on the unit ball

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Assume that $\Omega \subset \mathbb{R}^d$ is a Lebesgue measurable domain of finite measure, and $\phi : [0, \infty) \rightarrow [0, \infty)$ is a function with $\phi(\xi) \rightarrow 0$ as $|\xi| \rightarrow \infty$. If for $a \neq a'$

$$|\widehat{\chi_\Omega}(a - a')| \leq \phi(|a - a'|),$$

we say that $e^{2\pi i x \cdot a}$ and $e^{2\pi i x \cdot a'}$ are ϕ -approximately orthogonal.

This is a weakened statement of the mutual orthogonality of exponential functions on Ω . In this talk, we show that if Ω is the unit ball in dimension $d > 1$, and ϕ decays sufficiently fast as $t \rightarrow \infty$, then the unit ball can not admit any ϕ -approximate orthogonal frame of exponentials. We'll wrap up the talk by announcing a new result that shows that even approximate average orthogonality is an impediment to the existence of an exponential frame.