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Convergence and Divergence of Convolution Operators

We consider $\mathbb{R}^d$ actions as groups of invertible measure preserving transformations on probability spaces. There are many interesting theorems and open questions related to the convergence and divergence of sequences of operators determined by these actions, in particular for those given by convolutions by $L_1(\mathbb{R}^d)$ functions. The behavior of these operators is closely tied to the harmonic analysis of convolutions by these functions on $L_p(\mathbb{R}^d)$, $1 \le p \le \infty$. Oscillation, rate of divergence, and saturation theorems will be the focus of this talk.