

Applications of Kazhdan's property to automatic continuity

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Let G be a compact group which has the strong Kazhdan's property (T) and let τ be an isometric representation of G on $L^p(\mu)$ for some measure space (Ω, Σ, μ) and $1 < p < \infty$. We characterize the continuity of all the linear operators from $L^p(\mu)$ which commute with translations and the property of $\|\cdot\|_p$ being the unique norm (up to equivalence) on $L^p(\mu)$ with respect to which all translations are continuous in terms of the finite-dimensionality of the subspace of all invariant functions.