## ABSTRACT

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A Paley-Wiener Theorem for All Two and Three-Step Nilpotent Lie Groups

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A Paley-Wiener Theorem for all connected, simply-connected two and three-step nilpotent Lie groups is proved. If $\varphi \in L_c^{\infty}(G)$, where $G$ is a connected, simply-connected two or three-step nilpotent Lie group such that the operator-valued Fourier transform $\widehat{\varphi}(\pi) = 0$ for all $\pi$ in $E$, a subset of $\widehat{G}$ of positive Plancherel measure, then it is shown that $\varphi = 0$ a. e. on $G$. The proof uses representation-theoretic methods from Kirillov theory for nilpotent Lie groups, and uses an integral formula for the operator-valued Fourier transform $\widehat{\varphi}(\pi)$. It is also shown by example that the condition that $G$ be simply-connected is necessary.