Title: Spectral gap and strong ergodicity properties for group automorphisms action on nilmanifolds.

Let $X$ be a compact nilmanifold, $T$ its maximal factor torus, $G$ a subgroup of $\text{Aut} X$, $\mu$ a probability measure on $G$ such that the support of $\mu$ generates $G$. We consider the action of $G$ on the Hilbert space of square integrable functions on $X$, and we denote by $P$ (resp $Q$) the Markov operator on $X$ (resp $T$) defined by $\mu$. We show that if $P$ has a spectral gap if and only if $Q$ has a spectral gap. We give also a necessary and sufficient condition for a spectral gap, in terms of the action of $G$ on a suitable torus factor of $T$. 