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The Pompeiu problem for locally compact groups

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Let $n \geq 2$ and let K be a compact subset of \mathbb{R}^n with positive Lebesgue measure. The classical Pompeiu problem asks the following: Is $f = 0$ the only continuous function on \mathbb{R}^n that satisfies

$$\int_{\sigma(K)} f \, dx = 0$$

for all rigid motions σ ?

In this talk we will discuss this problem in the setting of locally compact groups G , with continuous functions replaced by $L^2(G)$ and rigid motions replaced by translations. Unlike \mathbb{R}^n , G might not be abelian, so we will focus on two-sided translations. We will give results for various classes of groups, specifically type I groups and discrete groups.