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A new uncertainty principle for unimodular groups

Heisenberg's celebrated uncertainty principle, concerning measurements of position and momentum, roughly states that a function $f \in L_2(\mathbb{R})$ of norm 1 and its Fourier transform \hat{f} cannot both be highly concentrated. In 1957, Hirschman extended this uncertainty relation to locally compact Abelian groups by using the relative entropy with respect to the Haar measure to quantify the degree of concentration. In this talk, we will extend Hirschman's result to unimodular locally compact groups by invoking the theory of non-commutative L_p spaces and a generalized Hausdorff–Young inequality. Time permitting, we will discuss potential applications, extensions to unimodular Kac algebras, and relations to other uncertainty principles. This is joint work with Mehrdad Kalantar.