

DALHOUSIE MATHEMATICS COLLOQUIUM

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Fourier analysis on non-Abelian topological groups

Fourier transform and its analogues are the cornerstone of classical harmonic analysis. To generalize the concept of Fourier transform to non-Abelian groups, the modern field of non-commutative harmonic analysis was initiated. The broad philosophy here is to employ group representations and the theory of operators on Hilbert spaces to capture the non-Abelian nature of a group. A major trend in non-commutative harmonic analysis is to investigate function algebras related to Fourier analysis (and representation theory) of non-Abelian groups. The Fourier algebra, which is associated with the regular representation of the ambient group, is a fundamental example of such function algebras. In this talk, we investigate Banach algebraic behavior, in particular derivation theory and spectral theory, of the Fourier algebra and its weighted versions for various classes of locally compact (Lie) groups, and show that these function algebras encode the properties of the underlying groups in various ways. We then present some applications of non-commutative harmonic analysis in the theory of continuous wavelet transforms.