APERIODIC ZAK TRANSFORMS

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Abstract

A central role in the spectral theory of invariant differential operators on Heisenberg nilmanifolds is played by intertwiners constructed using the Zak transform from time frequency analysis. We provide an interpretation of these intertwiners as twisted Siegel-Radon transforms which allows us to define similar intertwiners, which we call *aperiodic Zak transforms*, in a variety of different contexts.

As a main application we discuss the construction of explicit eigenfunctions in non-homogeneous dynamical systems arisings as orbit closures of sufficiently discrete subsets of positive density in Heisenberg groups. The key ingredient in these results is an extension theorem which allows one to extend aperiodic Zak transform to suitable L^2-spaces.

The results presented in this talk illustrate general techniques developed in a joint project with Michael Björklund (Chalmers), which aims to develop a theory of automorphic forms over non-homogeneous dynamical systems of semisimple Lie groups. We will comment on the difficulties which arise when trying to extend the above results from the nilpotent to the semisimple setting.