Title: The LGC method

Abstract: In this talk we will discuss in the context provided by some relevant problems/applications a versatile method developed by the author in order to analyze the boundedness properties of large classes of (sub-)linear or multi-linear operators. This so-called \emph{LGC-method} consists of three key steps:

1) phase \emph{linearization}: the time/frequency plane is discretized in regions within which the phase of the operator's multiplier oscillates at the linear level;

2) \emph{Gabor} frame discretization: within each of the regions obtained at the first item, one performs an adapted Gabor frame decomposition of the input functions;

3) \emph{cancelation} via \emph{time-frequency correlation}: the resulting discretized operator is now analyzed at the L^2 level via a TT^{*} argument exploiting the size distribution of the Gabor coefficients via the structure of the time-frequency correlation level sets.

As a consequence of this methodology one can provide a unified approach to three main themes in Harmonic Analysis:

a) The Linear Hilbert Transform and Maximal Operator along variable curves;

b) Carleson Type operators in the presence of curvature;

c) The bilinear Hilbert transform and maximal operator along variable curves.

More recent applications of this method to new classes of \emph{hybrid} operators (i.e. having \emph{both zero and non-zero curvature} features)--including but not restricted to the Bilinear Hilbert Carleson operator--will also be discussed.