Transversal multilinear harmonic analysis

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Abstract

Many important problems in multivariable euclidean harmonic analysis concern the control of a linear operator whose subtle properties are due to the presence of some underlying curved manifold (this is a popular and enduring perspective made explicit in work of Stein and Wainger from 1978). In some situations such operators have multilinear counterparts where the role of curvature is replaced by a notion of transversality. The main focus of these lectures will be the recent multilinear approach to Stein's celebrated restriction conjecture for the Fourier transform. In particular, the d-linear restriction problem will be discussed in some detail, including its relation with the classical linear problem via the 2010 method of Bourgain and Guth. We conclude with a description of a bigger picture which encompasses oscillatory integrals of Hörmander type and a broad class of multilinear Radon-like transforms that arise in dispersive PDE.