ALGEBRAIC ASPECTS OF HARMONIC ANALYSIS

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Abstract: When we want to understand a geometric picture, finding the zero set of a polynomial hiding in it can be very helpful: it can reveal structure and allow computations. Polynomial partitioning, developed by Guth and Katz, is a technique to find such a nice algebraic hypersurface. Polynomial partitioning has revolutionised discrete incidence geometry in the recent years, thanks to the fact that interaction of lines with algebraic hypersurfaces is well-understood. Recently, however, Guth discovered agreeable interaction between tubes and neighbourhoods of algebraic hypersurfaces, and thus used polynomial partitioning to improve on the 3-dim restriction problem. In this talk, we will present polynomial partitioning via a discrete analogue of the Kakeya problem, and discuss its potential to be extensively used in harmonic analysis.