

1116-05-1515

**W Timothy Gowers\***, Centre for Mathematical Sciences, Wilberforce Road, Cambridge, CB3 0WB, United Kingdom. *Arithmetic progressions of length 4, quadratic Fourier analysis, and 3-uniform hypergraphs.*

In this lecture I shall say something about quadratic (and higher-order) Fourier analysis, which relates to notable results such as Szemerédi's theorem and the Green-Tao theorem. I shall also discuss a notion of quasirandomness for hypergraphs and show that it relates to quadratic Fourier analysis in a similar way to the way that quasirandom graphs relate to conventional Fourier analysis.

I shall also discuss the more general question of what one would ideally like from a generalization of Fourier analysis. Quadratic Fourier analysis has enough of the desired properties to be a useful technique, but there are certain properties that it lacks, at least in its current form, and there are therefore interesting challenges for future research.

Some parts of this lecture will be hard to understand by people who have not attended the first lecture, but I will try to recap the most important ideas. This lecture will, however, not be necessary for following the third. (Received September 20, 2015)