

## **abstract**

ANALYTIC AND GEOMETRIC NUMBER THEORY SEMINAR

Topic:

Speaker:

Affiliation:

Date:

Time/Room:

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For the last 5 years or so Terry Tao and I have been working on a programme to prove certain conjectures of Hardy and Littlewood concerning the number of primes vectors  $p = (p_1, \dots, p_n)$  in some box which satisfy the equation  $Ap = b$ . The number of such solutions should be determined, asymptotically, by "local" considerations and our aim is to prove this, provided that  $A$  is "nondegenerate" (which, sadly, means we do not propose to resolve the twin prime or Goldbach conjectures).

In 2006 we reduced this task to that of proving two families of conjectures. We established the first of these in 2007, leaving the task of proving the second family of conjectures, known as the "inverse conjectures for the Gowers norms". There is one of these for each of the so-called Gowers norms  $U^2, U^3, U^4, \dots$ . The inverse conjecture for the  $U^2$  norm can be proved by about one line of harmonic analysis, and the inverse conjecture for the  $U^3$  norm was proved in a 70-page paper of Tao and I. Recently, with Tammy Ziegler, we appear to have established the general case, although we have only worked out and written up all the details in the case of the  $U^4$  norm. The paper handling this case is a mere 40 pages long, and I propose to talk about some aspects of the argument.