

## abstract

[Video of this lecture](#) COMPUTER SCIENCE/DISCRETE MATH I

Topic:

Speaker:

Affiliation:

Date:

Time/Room:

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I will be describing recent joint efforts with Tim Gowers to decompose a bounded function into a sum of polynomially structured phases and a uniform error, based on the recent inverse theorem for the  $U^k$  norms on  $F_p^n$  by Bergelson, Tao and Ziegler. The main innovation is the idea of defining the rank of a cubic or higher- degree polynomial (or a locally defined quadratic phase) analytically via the corresponding exponential sum, which turns out to imply all the properties of rank needed in proofs. As an application we prove a conjecture regarding the complexity of a system of linear forms that we made in 2007: A system of linear forms  $L_1, \dots, L_m$  on  $F_p^n$  is controlled by the  $U^{\{k+1\}}$  norm if and only if  $k$  is the least integer such that the functions  $L_i^{\{k+1\}}$  are linearly independent.