

**Emanuele Viola**

*Correlation bounds for polynomials, and the disproof of the Inverse Conjecture for Gowers' norm using Ramsey theory*

Polynomials are fundamental objects in mathematics and computer science that arise in a variety of contexts, such as error-correcting codes and circuit lower bounds. Despite intense research, many basic computational aspects of polynomials remain poorly understood. For example, although it is known that most functions cannot be approximated by low-degree multivariate polynomials, an explicit construction of such a function is still unknown.

In this talk we discuss a few problems and recent results on multivariate polynomials over  $GF(2)$ .

In particular, we present a proof of the result by Green and Tao, and by Lovett, Meshulam, and Samorodnitsky that a certain inverse conjecture – related to polynomials and “Gowers' norm” – is false. The proof is based on a Ramsey-theoretic argument by Alon and Beigel.