

DISSERTATION DEFENSE

On Algorithmic Hypergraph Regularity

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Abstract

Thomason and Chung, Graham and Wilson were the first to systematically study *quasi-random* graphs and hypergraphs and showed that several properties of random graphs imply each other in a deterministic sense. In particular, they showed that ε -regularity from Szemerédi's regularity lemma is equivalent to their concepts. Over recent years several hypergraph regularity lemmas were established.

In this talk, we focus on two regularity lemmas for 3-uniform hypergraphs one due to Gowers, and one due to Haxell, Nagle and Rödl. Their lemmas are based on different notions of quasi-random hypergraphs and we show that their concepts are in fact equivalent. Since the regularity lemma of Haxell et al. is algorithmic, we also obtain an algorithmic version of Gowers' regularity lemma. Further, we use Gowers' analytic approach to the hypergraph regularity lemma to give a more direct proof of the algorithmic version of his regularity lemma.

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