

## **Emmanuel Breuillard**

Title: Approximate groups

Abstract: I will describe a recent joint work with Ben Green and Terence Tao in which we study large finite subsets of an ambient group that are almost closed under multiplication, i.e. the so-called approximate groups. I will first survey the basic definitions and properties regarding approximate groups in a general context. Then, bringing tools from combinatorics and making key use of the geometry of simple algebraic groups I will give a classification of their approximate subgroups. These results bring a new twist to the standard results on the growth of groups in geometric group theory by taking into account the size of the generating set. I will also describe applications of these results to showing that random Cayley graphs of finite simple groups of Lie type are expanders graphs (joint also with Bob Guralnick).