MINICOURSE

Tuesday, January 16\textsuperscript{th} from 14:00 to 16:00  
Thursday, January 18\textsuperscript{th} from 11:00 to 12:00  
Friday, January 19\textsuperscript{th} from 10:00 to 12:00

In Room AAC 006

To be followed by discussion;  
“Finite simple groups and expanders”

Martin Kassabov (Cornell University, USA)

Target audience: doctoral students, researchers and Professors in Mathematic.

Abstract:

Expanders are highly connected finite graphs which play a fundamental role in theoretical computer science. Informally, a graph is an expander if it cannot be separated into two large parts by removing a small number of vertices and the adjoining edges. The existence of families of expander graphs follows from a standard counting argument, however constructing expanders explicitly is a difficult task. The first explicit family of expander graphs was constructed by Margulis using Kazhdan property T of lattices in higher rank Lie groups.

In this mini-course I will describe an algebraic approach to property T, started by Y. Shalom. It uses mostly the decomposition of a group as a product of "nice" subgroups (like bounded generation), just a little of representation theory. This approach not only proves that some groups have property T but also gives estimates for the Kazhdan constants with respect to some generating sets.

The same methods can also be used to construct "unnatural" generating sets in some finite groups which have nice expanding properties. I will also describe how to construct a generating set of bounded size for any finite simple group (with the exception of the Suzuki groups) such that the Cayley graphs are expanders.