

# SEMINÁRIO DE ÁLGEBRA

## Stability, non-approximated groups and high-dimensional expanders.

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14:30 Horas

Zoom

### Abstract.

Several well-known open questions, such as: "are all groups sofic or hyperlinear?" , have a common form: can all groups be approximated by asymptotic homomorphisms into the symmetric groups  $Sym(n)$  (in the sofic case) or the unitary groups  $U(n)$  (in the hyperlinear case)? In the case of  $U(n)$ , the question can be asked with respect to different metrics and norms. We answer, for the first time, some of these versions, showing that there exist finitely presented groups which are not approximated by  $U(n)$  with respect to the Frobenius (=  $L_2$ ) norm and many other norms. The strategy is via the notion of "stability": Some higher dimensional cohomology vanishing phenomena is proven to imply stability. Using Garland method ( a.k.a. high dimensional expanders as quotients of Bruhat-Tits buildings), it is shown that some non-residually-finite groups are stable and hence cannot be approximated. These groups are central extensions of some lattices in p-adic Lie groups (constructed via a p-adic version of a result of Deligne). All notions will be explained. Based on joint works with M. De Chiffre, L. Glebsky and A. Thom and with I. Oppenheim.