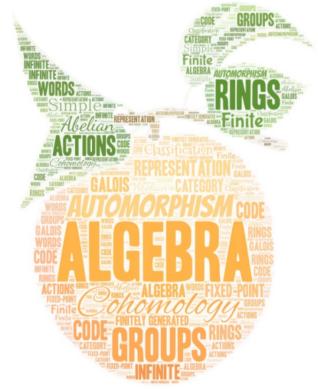


AI@Bicocca seminar

You are all welcome to the next bite of the series
“AI@Bicocca”

which is meant to give you a small taste of the
Algebra at Bicocca and beyond



16 February 2026
15.00 (UTC+1)

Lucas Corrêa Lopes

Universidade de Brasília

Using profinite Bass–Serre theory to classify subgroups of the profinite completion of 3-manifold groups

Abstract: In recent years, there has been great interest in detecting properties of the fundamental group $\pi_1(M)$ of a 3-manifold via its finite quotients or, more conceptually, via its profinite completion. This motivates the study of the profinite completion $\widehat{\pi_1(M)}$ of the fundamental group of a 3-manifold. Recent work from 2017 by H. Wilton and P. Zalesskii shows that typical decompositions of 3-manifold groups, such as free products with amalgamation, HNN extensions, and graphs of groups, are preserved under profinite completion. Thus, one can use the profinite analogue of Bass-Serre theory for groups acting on trees. However, this theory does not possess the full strength of its classical version. The main theorem of Bass-Serre theory does not hold in the profinite case. As a consequence, subgroup theorems do not hold, in general, for profinite groups and even for free profinite products; that is, the profinite version of the Kurosh subgroup theorem is not valid. This implies that it is reasonable to study the subgroup structure of free constructions for important subclasses of profinite groups. The most important subclasses of profinite groups are prosoluble groups and pro- p groups, as they play the same role as p -groups and soluble groups in finite group theory. In particular, this applies to the profinite completion of 3-manifold groups. Such a study for pro- p subgroups was carried out in 2017, when the structure of finitely generated pro- p subgroups of the profinite completion of the fundamental groups of a 3-manifold was described. The goal of this talk is to expose how it was done for finitely generated prosoluble subgroups using the profinite version of Bass-Serre theory.

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