CENTRO DE MATEMÁTICA
UNIVERSIDADE DO PORTO

Algebra, Combinatorics and Number Theory Seminar

Date. Wednesday, April 30, 2025 - 4pm [1]

Place. Online seminar

Speaker. Mateus Figueiredo - Universidade de Brasília

Title. On the structure of groups with prime power commutators

Abstract. This presentation is based on joint work with P. Shumyatsky. We study the class of all finite groups in which every commutator has prime power order. A group in this class is called a CPPO-group. Our interest in this class arose from the observation that it includes, as a subclass, all finite groups in which every element has prime power order – commonly known as EPPO-groups. These were the subject of foundational work by G. Higman and M. Suzuki: Higman described the soluble EPPO-groups, and subsequently, Suzuki classified the (nonabelian) simple EPPO-groups, proving that only eight isomorphism classes of such groups exist.

Although the class of CPPO-groups is significantly broader than that of EPPO-groups, we demonstrate that the structure of the derived subgroup of a CPPO-group exhibits notable similarities to that of an EPPO-group. Specifically, we prove that the Fitting height of a soluble EPPO-group G is at most 3, and that the order of G' is divisible by no more than two distinct primes. Furthermore, if G is a nonsoluble CPPO-group, then G' is perfect, its soluble radical $R(G')$ is a 2-group, and the quotient group $G'/R(G')$ is isomorphic to a (nonabelian) simple EPPO-group.

A key component of our approach involved techniques developed by A. Turull, particularly the use of *Turull towers*, which played a crucial role in establishing the upper bound on the Fitting height.

[1] https://fc-up-pt.zoom.us/j/85243807260

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