Joint Mathematics Colloquium
ICMAT-UAM-UC3M-UCM

The Higher Infinite and its role in Mathematics

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15 April 2024 - 13:00

The Higher Infinite refers to the infinite cardinalities studied by set theory, as charted by large cardinal hypotheses known as large cardinal axioms. These axioms assert the existence of infinite cardinals so large that their existence cannot be proved within the standard ZFC system of set theory. Since the weakest of large cardinals, the "weakly inaccessible", were first defined and studied by Hausdorff over a century ago, a plethora of different and much stronger large cardinals have since then been identified in a great variety of contexts and taking many different forms. Indeed, after the groundbreaking results of Martin-Steel and Woodin in the 1980's, establishing the tight connection between large cardinals and the determinacy of sets of reals, the theory of large cardinals has been expanding in multiple directions, yielding solutions to many well-known set-theoretic problems, as well as fertile applications to other areas of mathematics, from general to algebraic topology and homotopy theory, to abelian groups, etc. In this talk I will present some examples of large cardinals and will explain their role in mathematics by giving a number of examples in different areas where they have been applied to solve prominent open problems, some of them very recent.

Salón de Grados del Edificio Padre Soler, Campus de Leganés,
Universidad Carlos III de Madrid

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Grant CEX2019-000904-S funded by: