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SEMINAR ANNOUNCEMENT

Thursday June 12th, 2025

at 10:00 am
Room "Sala Seminari" - Abacus Building (U14)

Algebraic and Combinatorial Perspectives on Cellular Automata

Speaker
Giuliamaria Menara
research assistant at the University of Milano-Bicocca

Abstract
Cellular Automata (CA) are traditionally studied through their dynamical behavior, yet their rich algebraic and combinatorial structures offer equally compelling insights. This talk surveys recent advances on the structural analysis of CA. We begin by exploring how linear bipermutive CA can be leveraged in cryptographic applications. We then shift focus to the algebraic properties of non-linear CA, particularly the roles of permutivity: by identifying precise conditions under which non-linear CA exhibit these properties, we pave the way to uncover deeper connections between their local rule structure and global behavior.

References:
1. Manzoni L., Mariot L., Menara G., Combinatorial Designs and Cellular Automata: A Survey, arXiv:2503.10320 (2025)
2. Ben Ramdhane F., Dennunzio A., Margara L., Menara G., Structural Properties of Non-Linear Cellular Automata: Permutivity, Surjectivity and Reversibility, arXiv:2504.15949 (2025)

Short Bio
After completing a MSc in Mathematics at the University of Trieste in 2019 and a MSc in Applied Mathematics at the University of Delaware in 2021, Giuliamaria Menara obtained the PhD in Mathematics from the University of Trieste in 2025. She is now a research assistant at the University of Milano-Bicocca and her research interests are in the field of algebraic topology, combinatorics and dynamical systems.

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