

SEMINARIO DE ÁLGEBRA Y COMBINATORIA

Martes, 12 de abril de 2016

15:00 h., Aula Gris I (ICMat, Campus de Cantoblanco)

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A family of Lyndon words determined
by the Three Gap Theorem

Resumen:

We present the Three Gap Theorem, a result that studies the set of numbers $\{\{k\theta\}, k = 0, 1, \dots\}$ for a fixed real number $0 < \theta < 1$, being $\{x\}$ the decimal part of x . This result manages to connect three notions –well-formed scales, expansions in continued fractions and Christoffel words– that come from three very different fields: Musical Scale Theory, Number Theory and Algebraic Combinatorics on words.

The aim of the talk is to introduce some of the basic tools of this late field, paying special attention to Christoffel words. These words are produced when two periodic phenomena with coprime period collide. We will describe these binary words from various angles: using their geometrical interpretation, using Lyndon words and as finite factors of Sturm words. The set of Christoffel words coincides with the *binary* words that are determined within the Three Gap Theorem. The other kind of words within this theorem are *ternary* and they are called non-well-formed (NWF) words. We explore some of their combinatorial properties. Finally we present the Lyndon-Christoffel words, a ternary generalization of Christoffel words and we explore the similarities between Christoffel, Lyndon-Christoffel and NWF words.