Nathalie Aubrun: *About the Domino problem on finitely generated groups.*

Subshifts of finite type are of high interest from a computational point of view, since they can be described by a finite amount of information - a set of forbidden patterns that defines the subshift - and thus decidability and algorithmic questions can be addressed. Given an SFT X, the simplest question one can formulate is the following: does X contain a configuration? This is the so-called Domino problem, or emptiness problem: for a given finitely presented group G, is there an algorithm that determines if the group G is tilable with a finite set of tiles?
In this lecture I will start with a presentation of two different proofs of the undecidability of the Domino problem on Z^2. Then we will discuss the case of finitely generated groups. Finally, the emptiness problem for general subshifts will be tackled.

Laurent Bartholdi: *Amenable groups.*

I shall discuss old and new results on amenability of groups, and more generally G-sets. This notion traces back to von Neumann in his study of the Hausdorff-Banach-Tarski paradox, and grew into one of the fundamental properties a group may / may not have -- each time with important consequences. Lecture 1. I will present the classical notions and equivalent definitions of amenability, with emphasis on group actions and on combinatorial aspects: Means, Folner sets, random walks, and paradoxical decompositions. Lecture 2. I will describe recent work by de la Salle et al. leading to a quite general criterion for amenability, as well as some still open problems. In particular, I will show that full topological groups of minimal Z-shifts are amenable. Lecture 3. I will explain links between amenability and cellular automata, in particular the "Garden of Eden" properties by Moore and Myhill: there is a characterization of amenable groups in terms of whether these classical theorems still hold.

Jason Bell: *Applications of algebra to automatic sequences and pattern avoidance.*

We will cover some of the more important results from commutative and noncommutative algebra as far as applications to automatic sequences, pattern avoidance, and related areas. We'll give an overview of some applications of these areas to the study of automatic and regular sequences and combinatorics on words.

Emilie Charlier: *Logic, decidability and numeration systems.*

The theorem of Büchi-Bruyère states that a subset of N^d is b-recognizable if and only if it is b-definable. As a corollary, the first-order theory of $(N,+,V_b)$ is decidable (where $V_b(n)$ is the largest power of the base b dividing n). This classical result is a powerful tool in order to show that many properties of b-automatic sequences are decidable. The first part of my lecture will be devoted to presenting this result and its applications to b-automatic sequences. Then I will move to b-regular sequences, which can be viewed as a generalization of b-automatic sequences to integer-valued sequences. I will explain how first-order logic can be used to show that many enumeration problems of b-automatic sequences give rise to corresponding b-regular sequences. Finally, I will consider more general frameworks than integer bases and (try to) give a state of the art of the research in this domain.

Samuel Petite: *Automorphism groups of low complexity subshift*

An automorphism of a subshift X is a self-homeomorphism of X that commutes with the shift map. The study of these automorphisms started at the very beginning of the symbolic dynamics. For instance, the well known Curtis-Hedlund-Lyndon theorem asserts that each automorphism is a cellular automaton. The set of automorphisms forms a countable group that may be very complicated for mixing shift of finite type (SFT). The study of this group for low complexity subshifts has become very active in the last five years. Actually, for zero entropy subshift, this group is much more tame than in the SFT case. In a first lecture we will recall some striking property of this group for subshift of finite type. The second lecture is devoted to the description of this group for classical minimal subshifts of zero entropy with sublinear complexity and for the family of Toeplitz subshifts. The last lecture concerns the algebraic properties of the automorphism group for subshifts with sub-exponential complexity. We will also explain why some group like the Baumslag-Solitar BS(1,n) or SL(d ,Z), d>2, can not embed into an automorphism group of a zero entropy subshift.

Luca Zamboni: *Monochromatic factorisations of words and Ramsey theory*

Given a finite colouring of A^+ (the free semigroup generated by a finite set A), we are interested in various types of monochromatic factorisations of infinite words $x=x_0x_1x_2...$ over the alphabet A. We will explore various connections, and in some cases equivalences, between the existence of such factorisations and fundamental results in Ramsey theory including the infinite Ramsey theorem, Hindman's finite sums theorem and partition regularity of IP sets.