Sixièmes journées "Besançon-Neuchâtel" d'Analyse Fonctionnelle.

Besançon, les 26 et 27 mai 2016.

Programme du Jeudi 26 mai.

À partir de 10h30 : accueil des participants (café).

11h30 - 12h20 : Alain Valette (Université de Neuchâtel)
"A functional analytic proof of Gromov's polynomial growth theorem (after N. Ozawa)."

Déjeuner

13h50 - 14h40 : Aude Dalet (Université de Franche-Comté)
"Lipschitz-free spaces and ℓ_1."

14h50 - 15h40 : Sanaz Pooya (Université de Neuchâtel)
"K-theory for the C*-algebra of the classical Lamplighter group."

Pause café

16h20 - 17h10 : Michaël Ulrich (Université de Franche-Comté)
"Investigating the unitary dual group."

17h20 - 18h10 : Abraham Rueda Zoca (Universidad de Granada)
"Diameter two properties, octahedrality and almost squareness in tensor product spaces."

20h : Dîner de la conférence.

Programme du Vendredi 27 mai.

9h40 - 10h30 : Maxime Gheysens (École Polytechnique Fédérale de Lausanne)
"Hilbert spaces can affinely spot amenability."

Pause café

11h10 - 12h : Beata Randrianantoanina (Miami University, Ohio)
"An example related to the Bourgain's discretization theorem."

Déjeuner.

13h30 - 14h20 : Florent Baudier (Texas A. M. University)
"The extended Ribe program and its influence."

14h30 - 15h20 : Tiebout Delabie (Université de Neuchâtel)
"Full box spaces of the free group."

Pause café.

16h - 16h50 : Sophie Grivaux (Université de Picardie)
"Kazhdan sets in groups and equidistribution properties."

Résumés des exposés.

Florent Baudier (Texas A M University)
"The extended Ribe program and its influence."

A celebrated rigidity theorem of Martin Ribe from 1976 asserts that if two Banach spaces are similar in the metric category (e.g. if they are uniformly homeomorphic) then they will look alike locally, in the sense that they must essentially have the same finite-dimensional subspaces. This beautiful rigidity theorem prompted Joram Lindenstrauss and Jean Bourgain to devise the following research program which is nowadays commonly called the Ribe program : Find purely metric characterizations of local properties of Banach spaces. The philosophy behind the Ribe program and its (wild) extension to non-local properties and operators shall be explained. Also, some of its most striking achievements will be discussed, as well as its (direct or indirect) influence in theoretical computer science, geometric group theory, topology and noncommutative geometry. The talk shall be tailored to, what we expect is, an audience with very diverse backgrounds.

Aude Dalet (Université de Franche-Comté)
"Lipschitz-free spaces and ℓ_1."

Let M be a pointed metric space and $Lip_0(M)$ the space of Lipschitz functions vanishing at 0. Endowed with the Lipschitz norm, this space is a Banach space. Denote $\mathcal{F}(M)$ the closed subspace of $Lip_0(M)^*$ spanned by the linear forms δ_x (such that $\delta_x(f) = f(x)$) and call it the Lipschitz-free space over M.

We will first study Lipschitz-free spaces over compact ultrametric spaces and prove that they are dual spaces isomorphic to ℓ_1, with a predual isomorphic to c_0. However, we will prove that Lipschitz-free spaces over ultrametric spaces are never isometric to ℓ_1. We will finally generalize this result and characterize metric spaces whose Lipschitz-free space is isometric to ℓ_1.

Tiebout Delabie (Université de Neuchâtel)
"Full box spaces of the free group."

In large scale geometry, we study metric spaces up to coarse equivalence. Some interesting spaces to look at are box spaces, which are metric spaces built using finite quotients of certain finitely generated groups. We will be looking at full box spaces of free groups on different numbers of generators.

Maxime Gheysens (École Polytechnique Fédérale de Lausanne)
"Hilbert spaces can affinely spot amenability."

Day proved in the early sixties a nice geometric fixed-point property characterising amenability. We show that such a characterisation already holds in the Hilbert world — hence in particular Hilbert spaces are not better-behaved than a general locally convex space from this viewpoint. Along the way, we introduce a variant of the classical induction suitable for non-isometric representations and investigate techniques allowing to transfer results about free groups to general non-amenable groups.
Joint work with Nicolas Monod.

Sophie Grivaux (Université de Picardie)
"Kazhdan sets in groups and equidistribution properties."

I will present some results, obtained jointly with Catalin Badea, concerning the description of Kazhdan sets in topological groups which do not necessarily have property (T). One of these results provides an equidistribution criterion for a subset of a group to be a Kazhdan set.

Sanaz Pooya (Université de Neuchâtel)
K-theory for the C*-algebra of the classical Lamplighter group

In this talk we discuss the Baum-Connes assembly map for the classical Lamplighter group $G = Z_2 \wr Z$. Since this is an amenable group, the Baum-Connes conjecture holds, i.e. we get a group isomorphism in the K-theory level. We would like to give a more descriptive picture of this group isomorphism, in the sense that we specify the generators of both sides.

Beata Randrianantoanina (Miami University, Ohio)
"An example related to the Bourgain's discretization theorem."

In a recent work, Giladi, Naor, and Schechtman, [Bourgain's discretization theorem, *Annales Mathematiques de la faculte des sciences de Toulouse*, vol. **XXI** (2012), no. 4, 817–837], obtained a new, better, lower estimate for the discretization modulus for embeddings of finite dimensional spaces into L_p spaces, $p \in [1, \infty)$. A natural question arose (and was suggested by Assaf Naor at the meeting of Simons Foundation, New York City, February 20, 2015) whether their method can be extended to spaces other than L_p, possibly all spaces.
I will present an example of the space where the above method cannot be directly applied.
Joint work with Mikhail I. Ostrovskii.

Abraham Rueda Zoca (Universidad de Granada)
"Diameter two properties, octahedrality
and almost squareness in tensor product spaces."

The study of the size of slices, non-empty relatively weakly open subsets and convex combinations of slices of the unit ball of a Banach space has emerged in the last few years. A Banach space X is said to have the slice diameter two property (respectively diameter two property, strong diameter two property) if every slice (respectively non-empty relatively weakly open subset, convex combination of slices of the unit ball) has diameter two. The above properties have shown to have strong connections with other geometrical properties such as octahedrality or almost squareness. The aim of the talk is to analyze when a (symmetric) tensor product space can enjoy the above properties. We will show, for instance, that a projective (respectively injective) tensor product space has the strong diameter two property whenever both factors have the strong diameter two property (respectively one factor is almost square). We will also exhibit some results for symmetric tensor product spaces. The talk is mainly based on recent joint works with J. Becerra Guerrero and G. López-Pérez.

Michaël Ulrich (Université de Franche-Comté)
"Investigating the unitary dual group."

Dual groups have been introduced by Voiculescu in the 80's but have not been thoroughly studied as of now. The goal of this presentation is to present some results and some questions that arise when we study the unitary dual group, which is the dual group analogue to the well-known free unitary quantum group.

Alain Valette (Université de Neuchâtel)
"A functional analytic proof of Gromov's polynomial growth theorem (after N. Ozawa)."

In the fall of 2015, Ozawa gave a new proof of Gromov's celebrated polynomial growth theorem (a finitely generated group with polynomial growth, is virtually nilpotent). Ozawa's proof involves on the one hand unitary representations and 1-cohomology ; on the other hand entropy of random walks on the group.