

Colloquium on the Geometry of Groups and Numbers

Thursday 8th of June 2017, room 15-25.502 of IMJ-PRG

- 13:30 - Opening of the colloquium, talk of Alain Valette :

Explicit Baum-Connes for lamplighter groups over finite groups

ABSTRACT: We consider a lamplighter group $G = F \wr \mathbb{Z}$ with F a finite group. Although the Baum-Connes is known for G (because G is amenable), it does not allow for an explicit computation either of the left-hand side (the G -equivariant K-homology of the classifying space of G -proper actions) or the right-hand side (the analytical K-theory of the reduced C^* -algebra of G). We provide an explicit proof of the Baum-Connes conjecture for G , by computing both sides and then the assembly map connecting them. We will focus in the talk on the left-hand side, where computation is made possible thanks to a 2-dimensional model for the classifying space. This is joint work with Ramon Flores and Sanaz Pooya.

- 14:10 - talk of Ralf Köhl :

Kac-Moody symmetric spaces

ABSTRACT: In this talk, I discuss a class of topological reflection spaces that has been introduced in collaboration with Freyn, Hartnick and Horn, and which we call Kac-Moody symmetric spaces. These generalize Riemannian symmetric spaces of non-compact type. A non-spherical Kac-Moody symmetric space is non-geodesic but nonetheless geodesically connected. Maximal flats in Kac-Moody symmetric spaces correspond to tori of the underlying split real Kac-Moody group. Unlike Riemannian symmetric spaces, non-spherical non-affine irreducible Kac-Moody symmetric spaces admit an invariant causal structure. The future and past boundaries of Kac-Moody symmetric spaces carry a natural simplicial structure and are simplicially isomorphic to the halves of the geometric realization of the twin buildings of the underlying split real Kac-Moody group. Every automorphism of the symmetric space is uniquely determined by the induced simplicial automorphism of the future and past boundary. The invariant causal structure on a non-spherical non-affine irreducible Kac-Moody symmetric space gives rise to an invariant pre-order on the underlying space, and thus to a subsemigroup of the Kac-Moody group. For many Kac-Moody symmetric spaces including the E_n -series, n at least 10, Kostant convexity allows one to establish that this pre-order is actually a partial order, which might be of interest for supergravity.

- 14:50 - talk of Mladen Dimitrov : *p-adic L-functions for $GL(2n)$*
 ABSTRACT: This is a report on an ongoing joint work with F. Januszewski and A. Raghuram aiming at constructing p -adic L -functions for cohomological cuspidal automorphic representations π of $GL(2n)$ over a totally real field admitting a Shalika model. Our results are partially motivated by their relation to the non-vanishing of the L -functions of twists of π at central critical points.
- 15:30 - coffee break
- 16:00 - talk of Hans-Werner Henn : *On the mod-2 cohomology of $SL_3(\mathbb{Z}[\frac{1}{2}, i])$*
 ABSTRACT: Let $\Gamma = SL_3(\mathbb{Z}[\frac{1}{2}, i])$, let X be any mod-2 acyclic Γ -CW complex on which Γ acts with finite stabilizers, e.g. the product of the symmetric space for $SL(3, \mathbb{Z}[i])$ and the Bruhat-Tits building for $SL_3(\mathbb{Q}_2[i])$, and let X_s be the 2-singular locus of X . We explain how to calculate the mod-2 cohomology of the Borel construction of X_s with respect to the action of Γ .
 This cohomology coincides with the mod-2 cohomology of Γ in cohomological degrees bigger than 8, and the result is compatible with a conjecture of Quillen which predicts the structure of the cohomology ring $H^*(\Gamma; \mathbb{Z}/2)$.
- 16:40 - talk of Günter Harder :
Divisibility of L-values and the existence of non trivial cohomology classes
 ABSTRACT: We consider a very special class of congruence subgroups of $Sl_2(\mathbb{Z}[i])$: For each of these congruence subgroups, the Eisenstein cohomology is essentially described in terms of special values of a specific Hecke character (which is determined by the subgroup).
 We analyze these special values and show that the divisibility of these special values by certain primes ℓ implies that the cohomology of the congruence subgroup contains some non trivial classes. These classes are either cuspidal classes or they are ℓ torsion classes.
 In an experiment, always the second case occurs (computation by D. Yasaki).
- 17:20 - talk of David Kohel : *Recognizing G_2*
 ABSTRACT: The *character method*, developed by Yih-Dar Shieh in his thesis, recognizes a Sato-Tate from an associated Frobenius distribution. Previous methods used moments of prescribed characters — coefficients of a characteristic polynomial of Frobenius. They correspond to symmetric product characters, which decompose into direct sums of high multiplicity. As a result, the moment sequences converge poorly to large integers.
 The *character method* replaces the moments with a precomputed list of irreducible characters, and from the orthogonality relations of characters implies that a Sato-Tate group G is recognized by inner products yielding 0 or 1 (for which the minimal precision to recognize one bit suffices).
 We make explicit the character theory method for the exceptional Lie group G_2 , and demonstrate its effectiveness with certain character sums associated to families of curves known to give rise to G_2 as its Sato-Tate group.
 This is joint work with Yih-DarShieh.

Organisers : Alexander D. Rahm and Gabor Wiese, Université du Luxembourg