Journées SL2R à Louvain-la-Neuve 2022

Rapport sur les contributions

https://indico.math.cnrs.fr/e/SL2R-LLN-2022

ID de Contribution: **9** Type: **Exposé**

Dirac operators for the BGG category O

jeudi 8 décembre 2022 15:00 (50 minutes)

Dirac operators were used in the context of Representation Theory by Parthasarathy in 1972, as invariant first order differential operators acting on sections of homogeneous vector bundles over symmetric spaces G/K in order to obtain realizations of the discrete series representations of G.

In a series of lectures in 1997, Vogan introduced an algebraic analogue of Parthasarthy's Dirac operator. By using this operator, he defined the so-called Dirac cohomology of $(\mathfrak{g}, K)$-modules X and conjectured a relation between the Dirac cohomology of X and its infinitesimal character, proved by Huang and Pandžić in 2001. Since then, Dirac cohomology has been computed for various families of modules, including highest weight modules, $A_{\mathfrak{q}}(\lambda)$ modules, generalized Enright-Varadarajan modules, unipotent representations, etc.

In this talk, we will present some results concerning Dirac operators for modules belonging to the standard BGG category $\mathcal{O}$ of a complex semisimple Lie algebra $\mathfrak{g}$. This category consists of the finitely generated, locally $\mathfrak{n}$-finite weight modules of $\mathfrak{g}$ and seems to be the "correct" module category to study questions raised by Verma concerning composition series and embeddings of Verma modules, and Jantzen concerning his so-called translation functors.

Orateur: AFENTOULIDIS, Spyros

ID de Contribution: **10** Type: **Exposé**

From group cohomology to pentagonal cohomology via quantization

jeudi 8 décembre 2022 14:00 (50 minutes)

Orateur: GAYRAL, Victor

ID de Contribution: **11** Type: **Exposé**

Aspects combinatoires et analytiques d'analogues quantiques de nombres

jeudi 8 décembre 2022 16:30 (50 minutes)

Dans un travail récent avec Valentin Ovsienko, nous avons introduit des q-analogues des nombres rationnels. Il s'agit de fractions rationnelles à coefficients entiers s'obtenant naturellement par une approche combinatoire. Un remarquable phénomène de stabilisation permet d'étendre la q-déformation à tout nombre réel menant à des séries formelles à coefficients entiers. Si à l'origine des q-rationnels on peut remonter à des calculs de polynômes de Jones pour des invariants de noeuds, les q-nombres dévoilent de remarquables propriétés permettant de revisiter des classiques de théorie des nombres (Fibonacci, Pell, Farey, Markov, Hurwitz,⋯). Nous discuterons divers aspects combinatoires et analytiques de ces q-nombres en présentant des résultats basés sur plusieurs collaborations avec L. Leclere, V. Ovsienko, et A. Veselov.

Orateur: MORIER-GENOUD, Sophie

ID de Contribution: **12** Type: **Exposé**

On graded and ungraded associativity

vendredi 9 décembre 2022 09:00 (50 minutes)

For a long time, by now, I have been working on geometries related to associative and non-associative algebras. First of all, I will discuss some aspects of associative structures, such as *associative geometries*, defined in work with M. Kinyon, https://arxiv.org/abs/0903.5441. Second, I will propose a framework of *graded associative* structures, following https://arxiv.org/abs/2109.00878v1. This graded framework grew out of the very general, functorial and ungraded approach to differential calculus https://arxiv.org/abs/2006.04452 – my hope is that this functorial approach would make sense also in the graded framework, thus opening a way to a functorial super-calculus. However, for the time being, this rather is conjectural and speculative – see also http://wolfgang.bertram.perso.math.cnrs.fr/WB-PCS.pdf

Orateur: BERTRAM, Wolfgang

ID de Contribution: **13** Type: **Exposé**

Deformed oscillators and fractional spin fields

vendredi 9 décembre 2022 10:00 (50 minutes)

Orateur: BOULANGER, Nicolas

ID de Contribution: **14** Type: **Exposé**

Hyperbolic locally compact groups of Type I

vendredi 9 décembre 2022 11:30 (50 minutes)

$SL(2, R)$ is an example of a hyperbolic locally compact group, i.e. a locally compact group that is Gromov hyperbolic with respect to the word metric associated with a compact generating set. This talk, based on joint work with Mehrdad Kalantar and Nicolas Monod, is devoted to the structure of hyperbolic locally compact groups that are of Type I. The Type I property formalizes the condition that their unitary representations are well behaved. I will discuss a general conjecture predicting that every Type I locally compact group shares a key structural feature with $SL(2, R)$, and outline a proof in the case of hyperbolic locally compact groups containing a uniform lattice.

Orateur: CAPRACE, Pierre-Emmanuel