

Journées « Invariants quantiques non semisimples »

Institut de Mathématiques de Jussieu

2-3 avril 2012

Lundi 2 avril, 15h, salle 1C12 : Alexis Virelizier (Montpellier)

Une construction 'universelle' des invariants quantiques des 3-variétés

Résumé: Nous codons les entrelacs par certains diagrammes qui vérifient des relations semblables à celles d'une algèbre de Hopf. En représentant ces diagrammes par une structure algébrique appropriée (par exemple une algèbre de Hopf catégorique munie d'une intégrale), on obtient un invariant des 3-variétés. De cette manière nous retrouvons les invariants quantiques de Reshetikhin-Turaev, d'Hennings-Kauffman-Radford, de Lyubashenko, de Turaev-Viro, et de Kuperberg. De plus cette méthode permet de construire de nouveaux invariants, notamment à partir de données non semisimples.

Lundi 2 avril, 16h30, salle 1C12 : Nathan Geer (Utah State University)

Generalized traces and modified dimensions

Abstract: In this talk I will discuss how to construct generalized traces on an ideal in certain module categories. As I will explain there are several examples in representation theory where the usual trace and dimension are zero, but these generalized traces and modified dimensions are non-zero. Such examples include the representation theory of the Lie algebra $\mathfrak{sl}(2)$ over a field of positive characteristic and quantum groups. I will also explain how traces give rise to topological invariants of links. This is joint work with Jon Kujawa, Bertrand Patureau, Vladimir Turaev and Alexis Virelizier.

Mardi 3 avril, 9h30, salle 7D1 : Bertrand Patureau-Mirand (Bretagne-Sud)

Kirby color and handle slide for the non semi-simple link invariants

Abstract: In the previous talk was explained how to re-normalize the Reshetikhin-Turaev invariants of links using modified traces. The next step to build 3-manifolds invariants is to consider how these invariants change when one does a Kirby II move. I will give some details on the complex colors for $U\mathfrak{sl}_2$. They are nilpotent ambidextrous modules from which one can form some kind of graded Kirby colors. Generically the associated link invariants satisfy invariance by handle slide. This is joint work with Nathan Geer and François Costantino.

Mardi 3 avril, 11h, salle 7D1 : François Costantino (Strasbourg)

Nilpotent Reshetikhin-Turaev invariants of 3-manifolds and the Volume Conjecture

Abstract: The goal of the talk is to review the construction of non-semi simple surgery invariants of three manifolds in the case of $\mathfrak{sl}_2$. After recalling the axiomatic properties of ADO invariants of links and their extensions to graphs we will outline the construction of the invariants through surgery presentations and discuss some of its key points. Then we will provide examples of topological applications of these invariants and in particular to the study of the Volume Conjecture. Even if this talk is the last of a series of four it is meant to be as self-contained as possible.