Institut de Mathématiques de Jussieu - Paris Rive Gauche

Catégorification et théorie des noeuds

9 avril 2014, Sophie Germain Salle 1009

10h :   **Antonio SARTORI**, University of York
          Lie superalgebras and categorification.

Intertwining operators of Lie algebra representations can be used to define link invariants, like the Jones polynomial, and their categorifications provide link homology theories. In the talk, I will approach the analogous construction in the super case : I will describe a graphical calculus for representations of the general linear Lie superalgebra, I will present a categorification using the BGG category $\mathcal{O}$ and I will discuss some issues which prevent, for now, the construction of associated link homology theories.

11h15 : **Geordie WILLIAMSON**, MPI Bonn
          The sl(N) web categories and categorified skew Howe duality

This will be a brief summary of work I did a while ago with Ben Webster. To any braid closure is assigned a complex of character sheaves from which one can recover triply graded link homology. I will try to explain why it would be very interesting to understand these complexes better.

14h :   **Ben Webster**, Univ of Virginia / FSMP
          Why all known categorifications of sl_n knot invariants are the same

The '00's were marked by the appearance of a remarkable number of homological knot invariants categorifying Reshetikhin-Turaev invariants for sl_n. Khovanov's original homologies for sl_2 and sl_3, Khovanov-Rozansky homology for sl_n and its generalization by Wu and Yonezawa, the foam invariants defined by Mackaay, Stosic and Vaz, the invariants of Cautis and Kamnitzer based on the geometry of the affine Grassmannian, Mazorchuk, Stroppel and Sussan using category $\mathcal{O}$, colored Jones homology defined using the categorified Jones-Wenzl projector of Cooper and Krushkal and invariants defined by myself using categorifications of tensor products. Unfortunately, we got a bit ahead of ourselves, and for a long time didn't know which of these were the same, and which ones potentially different.

Luckily, these issues are now resolved, based on observations of Cautis and Kamnitzer, developed further by Lauda, Queffelec and Rose. All of these homologies are the same, because all of them are controlled by a categorification of sl_∞ and the Chuang-Rouquier braid group inside it. I'll try to explain this general framework, and how one can check it applies in the case of categorifications of tensor products, requiring the use of a categorical skew Howe duality (work in progress, joint with Marco Mackaay).

Organisation : Christian Blanchet, Olivier Brunat, Olivier Dudas