Recent developments in the theory of Hall algebras

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Version française

Programme

Introduction

The theory of Hall algebras is closely related to the theory of representations and algebraic geometry. In a broad sense, a Hall algebra provides a tool allowing one to code a category. The object of this conference is to present current developments of the theory whose history we shall describe briefly here.

- The term is due to Ringel, who made reference to the works of Hall on symmetric functions where he gave a correspondence between an associative algebra and the category of nilpotent representations of the quiver consisting of a single vertex and a single cycle. In the early 90's, Ringel gave a new start to the theory. In the setting of hereditary categories, he defined a quantum version of Hall algebras, giving a realisation of the positive part of quantum Kac-Moody algebras. Note that it is thanks to this link established between the geometry of quiver representations and quantum groups that Lusztig developed his theory of canonical basis.
- In studying a Hall algebra associated to the category of coherent sheaves on the projective line, Kapranov opened a new direction in the theory. One can extend his study to the case of elliptic curves and of surfaces - see the works of Schiffmann and of Kapranov-Vasserot.
- Another recent development of the theory consists of associating a Hall type algebra to triangulated categories, or differential graded categories (Xiao, Toën, Caldero-Keller). One can thus realise Kac-Moody type Lie algebras, and also cluster algebras from certain triangulated categories.

The aim of this conference is to bring together some of the experts in the field, and also to provide an introduction of the theory to PhD students and young researchers.

The following speakers have confirmed their participation : P. Baumann, A. Hubery, M. Kapranov, B. Keller, O. Schiffmann, B. Toën, E. Vasserot, J. Xiao.

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