SEMINAIRE MATHEMATIQUE-INFORMATIQUE

Projet SAFIR
UNSA - INRIA - CNRS :
«*Systèmes Algébriques Formels pour l'Industrie et la Recherche* »

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«*Group Algebras, Lie Algebras, Clifford Algebras, Diagrams, and Algorithms* »

One of the principal applications of computer algebra systems has always been the calculation of terms in the perturbative expansion of quantum field theories (Feynman diagrams). In particular the calculation of group theoretic weights for gauge theories and of Dirac matrix traces are of considerable interest.
We shall develop a diagrammatic notation with which we shall study the theory of group algebras for finite groups, Lie algebras, and Clifford algebras, and their representations on associative algebras. Using these diagrammatic methods we shall develop a formalism which allows us the compute group theory weights (and related quantities) efficiently, and we shall present a few amusing and novel results along the way.
Issues related to the implementation of the algorithms developed for computer algebra systems may be mentioned, but will not be the primary goal of the presentation.