Algebra, Combinatorics & Mathematical Physics Seminar

Introduction to Lie algebras, Part II

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Abstract

Lie algebras is one of the basic notions of mathematics. Being non-associative algebras, they are connected with many branches of mathematics. In the last several years, the relationship between mathematics and fundamental physics has reached the most significant stage at which developments in one science yield important results for the other. Lie algebras, especially the infinite-dimensional ones, play a crucial rôle in this process. For example in the string theory and conformal field theory. The beautiful classical theory of Lie algebras and Lie groups was developed by the middle of the last century, it is connected with the names of S. Lie, W. Killing, H. Cartan, and H. Weyl.

We will start with some examples of Lie algebras and their representations, and then focus on the structures of complex simple finite-dimensional Lie algebras, which lead to the root systems, Cartan matrices, Dynkin diagrams, and Weyl groups.

The Cartan matrices set the classification of the simple finite-dimensional Lie algebras. Deforming conditions on the Cartan matrices of simple finite-dimensional Lie algebras, one may be led to infinite-dimensional Lie algebras. The fact that the Cartan matrices include enough information on the structures and on properties of Lie algebras was one of the backgrounds from which the theory of Kac-Moody algebras emerged so beautifully in the latter half of the 20-th century.

No previous knowledge about Lie algebras is needed.

Date: **Friday, October 31, 2008**
Time: 3:00pm–4:30pm
Place: MAGC 1.324

For further information or for special accommodations, please contact Dr. Elena Poletaeva (elenap@utpa.edu) or Dr. Kenichi Maruno (kmaruno@utpa.edu) or Dr. Virgil Pierce (piercevu@utpa.edu) .