Institute of Mathematical Research
Department of Mathematics

MINI COURSE

Division algebras, supersymmetry, and higher gauge theory

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Abstract

In physics, gauge theory is used to describe the parallel transport of particles. Higher gauge theory is a generalization to describe the parallel transport not just of particles but also extended objects, such as strings and membranes. For this course, we describe the emerging story of the higher guage theory of the classical superstring. We begin from first principles: no background in physics or gauge theory will be required.

Lecture 1:   May 9, 2013 (Thursday), 4:00 – 5:30pm

We give an overview of the course, and then describe how the relationship between the superstring and normed division algebras leads to higher gauge theory: they allow us to extend the symmetries of the spacetimes where string theory makes sense to particular L-infinity algebras we call the 'superstring Lie 2-algebras'.

Lecture 2:   May 16, 2013 (Thursday), 4:00 – 5:30pm

We would like to find a more global picture of these 'higher symmetries' of string theory, so in this lecture we show how to integrate Lie 2-algebras to Lie 2-groups, at least for special Lie 2-algebras which are nilpotent, such as a Lie 2-algebra we call the 'Heisenberg Lie 2-algebra'.

Lecture 3:   **May 24, 2013 (Friday), 3:30 – 5:00pm**

In practice, superstrings have supersymmetry, so we generalize the results of the last lecture by making everything in sight 'super': superalgebras instead of algebras, and supergroups instead of groups. This allows us to integrate the superstring Lie 2-algebra to a 2-supergroup, giving a global picture of the higher symmetry of string theory.

Room 210, Run Run Shaw Bldg., HKU

All are welcome