Gauge Fields and Strings

Instructor
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Summary of content
This course will develop the concept of gauge invariance in quantum field theory and string theory, starting from the basic ideas of symmetry principles. Topics to be covered include non-Abelian symmetry, path integrals for gauge fields, gauge theory Feynman rules (including interacions with fermions), the worldsheet description of strings propagating in spacetime, D-branes, and the promotion of worldsheet symmetries to spacetime gauge invariance in string theory. If time allows, we will also discuss briefly applications of these topics in current research. The primary textbooks will be *Quantum Field Theory* by Mark Srednicki and *A First Course in String Theory* (2nd ed) by Barton Zwiebach, but students will be expected to make use of other resources as provided by the instructor.

Prerequisites
Students will be able to benefit from this course only with a strong background in general relativity and a knowledge of scalar field theories including their renormalization. The student must demonstrate this knowledge to the instructor's satisfaction before registering for the course.

Contact hours
1.5 hour lecture and 30 min discussion session per week plus office hours by appointment.

Evaluation
Weekly reading summaries, approximately 5 or 6 homework assignments, and a final project (due during exam period).

Dates of course
5 Sept – 18 Dec 2013 (inclusive of examination period).