Superstring Geometry and Non-perturbative Formulation of Superstring Theory

Matsuo SATO[1]

Department of Natural Science, Faculty of Education, Hirosaki University
Bunkyo-cho 1, Hirosaki, Aomori 036-8560, Japan

Abstract

We define string geometry: spaces of superstrings including the interactions, their topologies, charts, and metrics. Trajectories in asymptotic processes on a topological space of strings reproduce the right moduli space of the super Riemann surfaces in a target manifold. Based on the string geometry, we formulate Einstein-Hilbert action coupled with gauge fields, and define superstring theory non-perturbatively by summing over metrics and the gauge fields on the spaces of strings. This theory does not depend on backgrounds. The theory has a supersymmetry as a part of the diffeomorphisms symmetry on the superstring manifolds. We derive the all-order scattering amplitudes that possess the super moduli in perturbative type IIA, type IIB and SO(32) type I superstring theories from the single theory, by considering fluctuations around fixed backgrounds representing type IIA, type IIB and SO(32) type I perturbative vacua, respectively. The theory predicts that we can see a string if we microscopically observe not only a particle but also a point in the space-time. That is, this theory unifies particles and the space-time.

[1]e-mail address : msato@hirosaki-u.ac.jp