

Semiclassical Strings and D-branes in Diverse String Backgrounds

Abstract

This thesis deals with the study of D-brane statics and dynamics in diverse string backgrounds. In the context of AdS/CFT duality, further we present rigidly rotating strings in a supersymmetric string background and find out a large class of string solutions relevant to the study of corresponding boundary theory. We present low energy background field solutions of a D3-branes at angle $\alpha \in SU(2)$ in type IIB string theory and study the unbroken spacetime supersymmetry in the presence of a light-like linear dilaton and other background fluxes. A class of intersecting branes have been studied in the PP-wave background coming from the near horizon and Penrose limit of a 1+1 dimensional intersection of two orthogonal stacks of NS5-branes, the so called I-brane background. In view of the getting more information about time-dependent string background, a part of the thesis is committed to study the dynamics of fundamental string (F-string) in the presence of D5-branes. We find a meta-stable orbit around D5-branes for a particular choice of energy and angular momentum of the probe F-string. We also present similar solutions for the dynamics of M2-brane around a stack of M5-branes in 11-dimensional supergravity. Further, we present a class of supersymmetric Gödel solutions in string theory which is obtained from the non-standard intersection of various branes. The spacetime supersymmetry of various D-branes have also been studied by analyzing the corresponding dilatino and gravitino variations explicitly.

Further, we study multi spin rigidly rotating strings in the Lunin-Maldacena background and found out a large class of spiky string solutions which can be useful in the better understanding of the semiclassical aspects of AdS/CFT duality better.

Keywords: D-brane, Supersymmetry, Linear Dilaton, PP-wave, NS5-brane, AdS/CFT duality.