

SUPERSTRINGS and SUPERSYMMETRY

[Igor Bandos]

Introduction: Big picture of String/M-Theory.

Supersymmetry: Supermultiplets. Simplest supersymmetric models in 4 spacetime dimensions. Cancellation of divergences in supersymmetric quantum field theories.

Superspace: Supersymmetric generalization of spacetime. Superfields. Supersymmetry as translations in 'fermionic directions' of superspace.

Local Supersymmetry: Supergravity.

Extended (N>1) Supersymmetry. Maximal N=4 supersymmetric gauge theories- the first known example of finite quantum field theory in four dimensional spacetime. Maximal N=8 supergravity.

Higher dimensional Supersymmetry and Supergravity. Maximal D=10 supersymmetric gauge theory and D=11 supergravity.

Dimensional reduction and spontaneous compactification of spacetime: N=8 supergravity in D=4 from dimensional reduction of 11D supergravity. Type IIA and type IIB supergravity in 10 dimensions.

Bosonic string model. Quantization, anomalies and critical dimension D=26. Gravity and gauge field theories as low energy limit of string.

Supersymmetry in string theory. Worldsheet supersymmetry of the spinning string. Spacetime supersymmetric Green-Schwarz superstring model. Kappa-symmetry. Quantization. Type II supergravity theories massless sector (low energy limit) of type II superstrings.

Supersymmetric extended objects, super-p-branes. Worldvolume actions. Super-p-brane solutions of supergravity equations.

Dualities in string theory. T-duality and S-duality.

M-theory.

AdS/CFT : Gauge-gravity correspondence and other recent developments.