

String Theory

1. Classical dynamics of relativistic point-like and extended objects (particles, strings, membranes, p-branes):
 - bosonic particles, strings, p-branes
 - spinning particles and strings (simplest examples of supersymmetric systems)
 - superparticles, superstrings and super-p-branes
2. Symmetries and constraints on the dynamics of relativistic objects, the Dirac analysis
3. Quantization and the quantum spectrum of (super)particles and (super)strings
 - the problem of covariant quantization
4. Supersymmetric theories in higher dimensions ($D=10,11$) and their string origin and dimensional reduction
 - ideas of Kaluza-Klein theory of the unification of gauge interactions with gravity
5. Dualities between different types of ten-dimensional string theories and corresponding supergravities.
 - M-theory as an eleven-dimensional corner of String Theory
6. D-branes
7. Black holes
 - review of black hole thermodynamics
 - black holes as bound states of D-branes and strings
 - construction of black hole solutions in supergravity via dualities
 - microscopic derivation of BPS black hole entropy: the 2-charge and the 3-charge cases.