

Columbia University Theory Seminar



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“Effective Strings Revisited”

String-like objects arise in many quantum field theories. Well known examples include flux tubes in QCD and cosmic strings. To a first approximation, their dynamics is governed by the Nambu-Goto action, but for QCD flux tubes numerical calculations of the energy levels of these objects have become so accurate that a systematic understanding of corrections to this simple description is desirable.

In the first part of my talk, I discuss an effective field theory describing long relativistic strings. The construction parallels that of the chiral Lagrangian in that it is based on the pattern of symmetry breaking. To compare with previous works, I will present the results of the calculation of the S-matrix describing the scattering of excitations on the string worldsheet.

In the second part of my talk, I will discuss critical strings from the same point of view and show that the worldsheet S-matrix in this case is non-trivial but can be calculated exactly. I will show that it encodes the familiar square-root formula for the energy levels of the string, the Hagedorn behavior of strings, and argue that the theory on the string worldsheet behaves like a 1+1 dimensional theory of quantum gravity rather than a field theory.

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