Towards a Theory of Confining Strings

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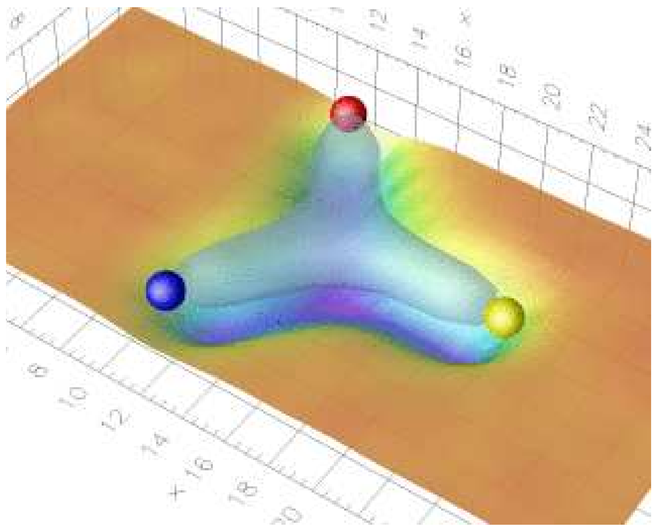
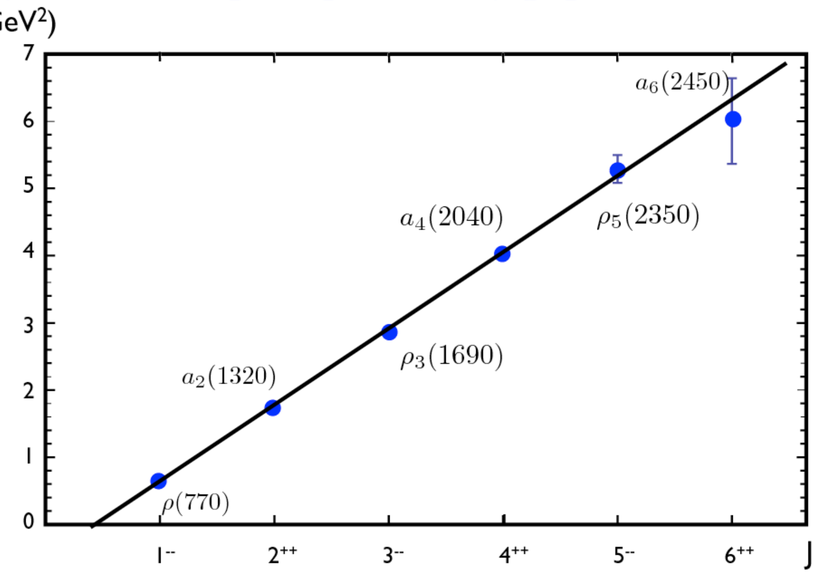
String Theory is Notoriously Hard to Test Experimentally

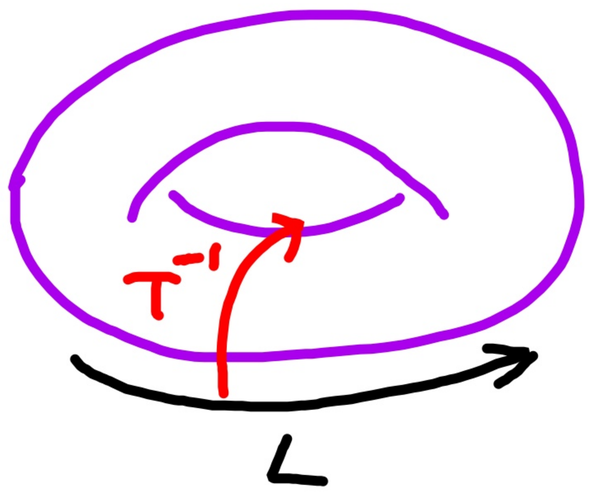
HOWEVER, STRINGS ARE EXPERIMENTALLY DISCOVERED 50 or so YEARS AGO!
STRONGLY INTERACTING PARTICLES IN QUANTUM CHROMODYNAMICS (QCD)
ARE STRINGS
WE DON'T UNDERSTAND THESE STRINGS YET



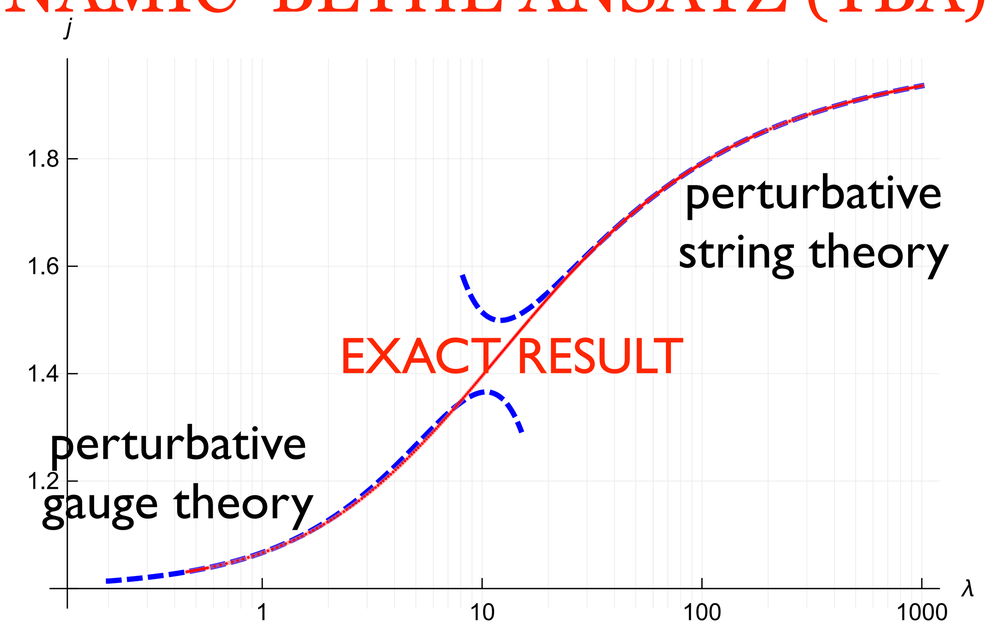


Remarkably, very recently strings were understood in N=4 SUSY cousin of QCD
The key is a special property of these strings: INTEGRABILITY
As a result many observables were calculated at any value of coupling constant

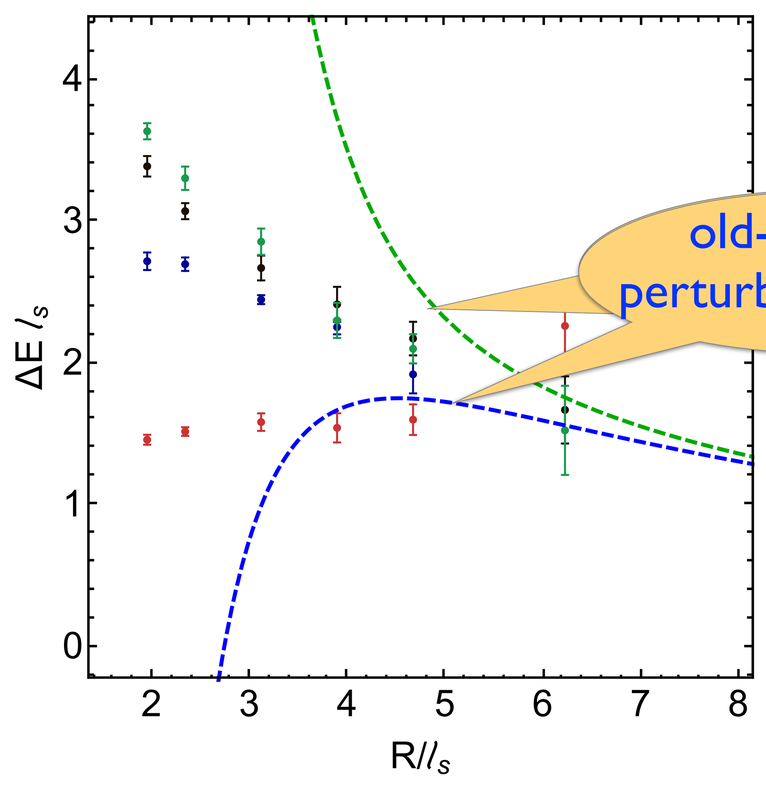
One of the principal tools: THERMODYNAMIC BETHE ANSATZ (TBA)



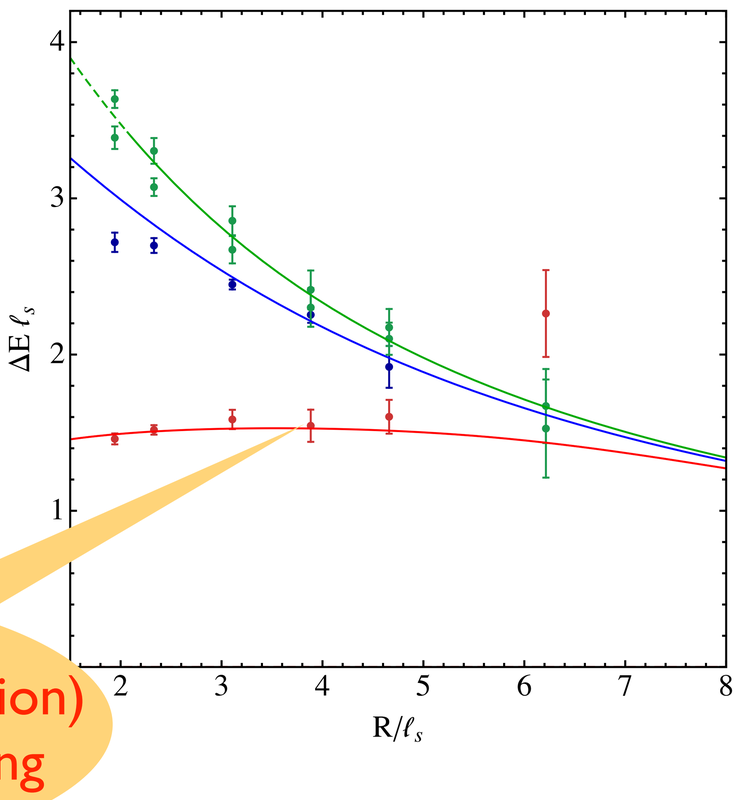
$$Z(T,L) = e^{-LE_0(1/T)} = e^{-Lf(T)/T}$$



THE VERY SAME TOOL WORKS REMARKABLY WELL ALSO IN QCD!



TBA



axion coupling
predicted from integrability

$$Q_I \approx 0.373\ldots$$

Hint of integrability
of the QCD string?!

axion coupling
from lattice data

$$Q_L \approx 0.38 \pm 0.04$$