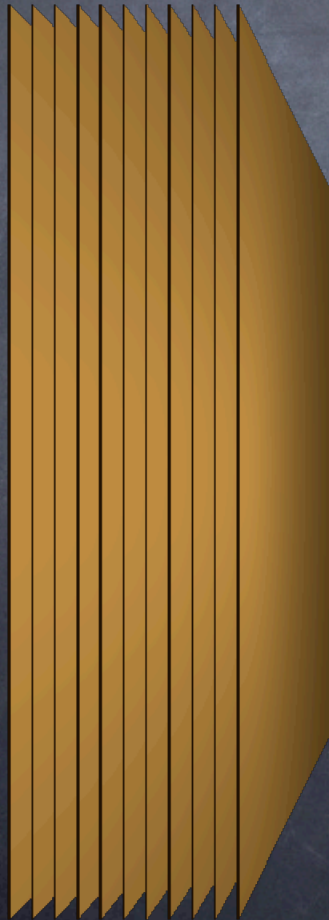


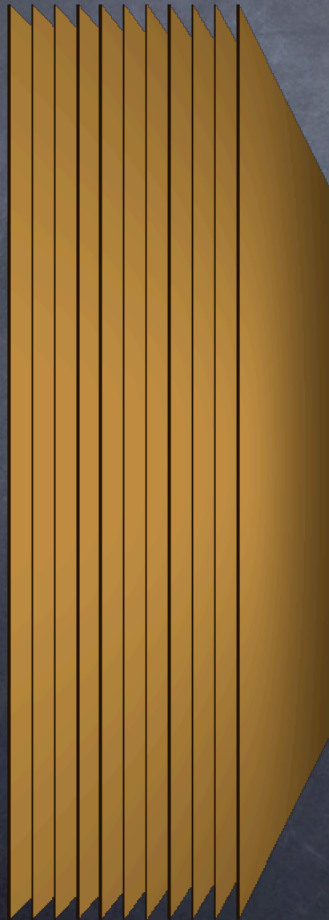
# Chapter 24: Extra Dimensions

# The Maldacena Conjecture



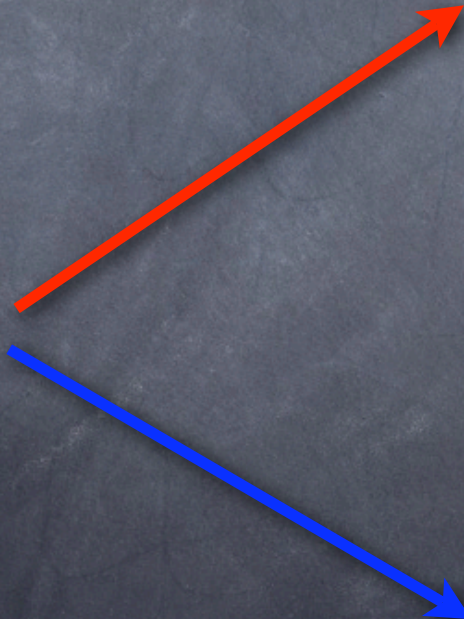
# The Maldacena Conjecture

3-dimensional branes



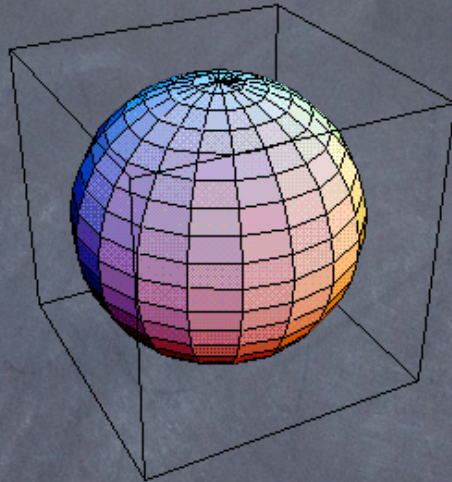
Four Dimensional  
strongly coupled

Five Dimensional  
weakly coupled

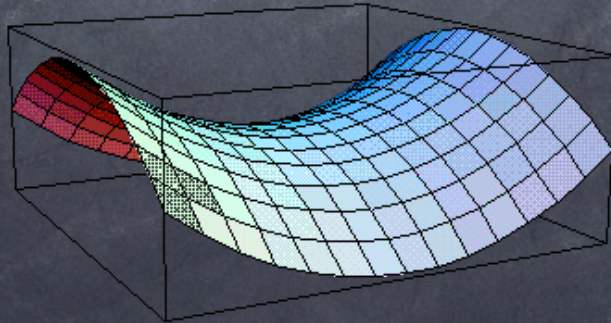


# Anti de Sitter $\times$ Sphere

$$S^5: R^2 = x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 + x_6^2$$



$$AdS_5: -R^2 = -uv - x_1^2 + x_2^2 + x_3^2 + x_4^2$$



# Maldacena's Conjecture

String Theory of  $N$  D3-branes

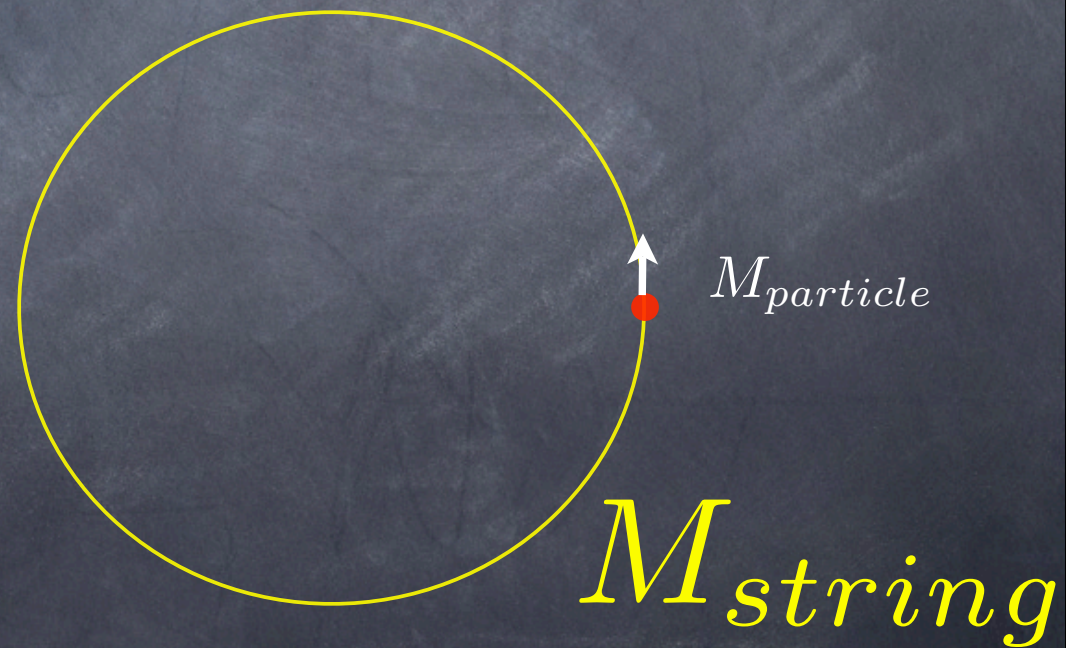
Low Energy  
Large  $N$ ,  
 $g^2 N$

Supersymmetric  
 $SU(N)$  gauge theory

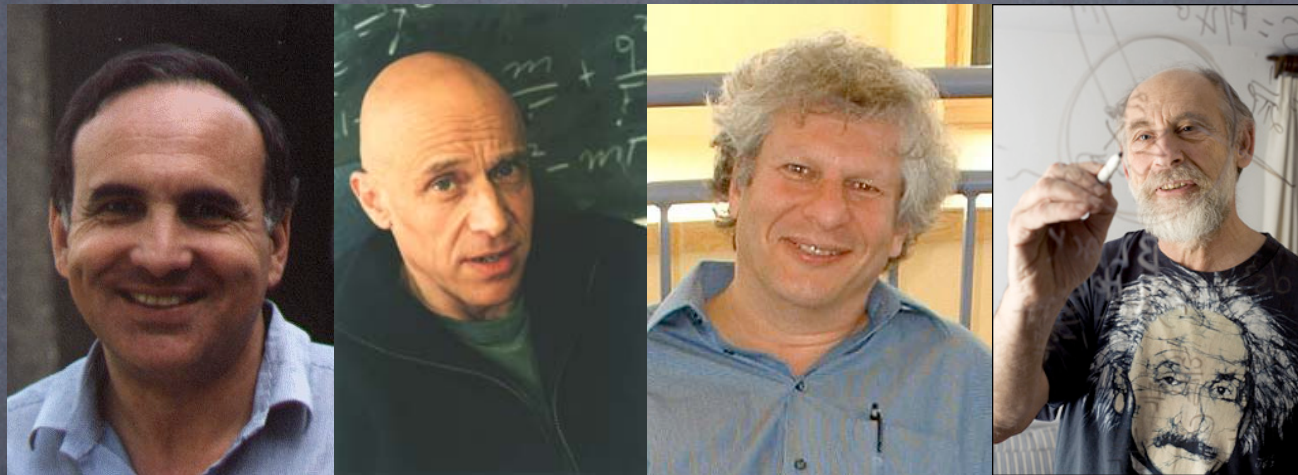
Supergravity  
on  $AdS_5 \times S^5$

i.e. same universality class

# T-Duality



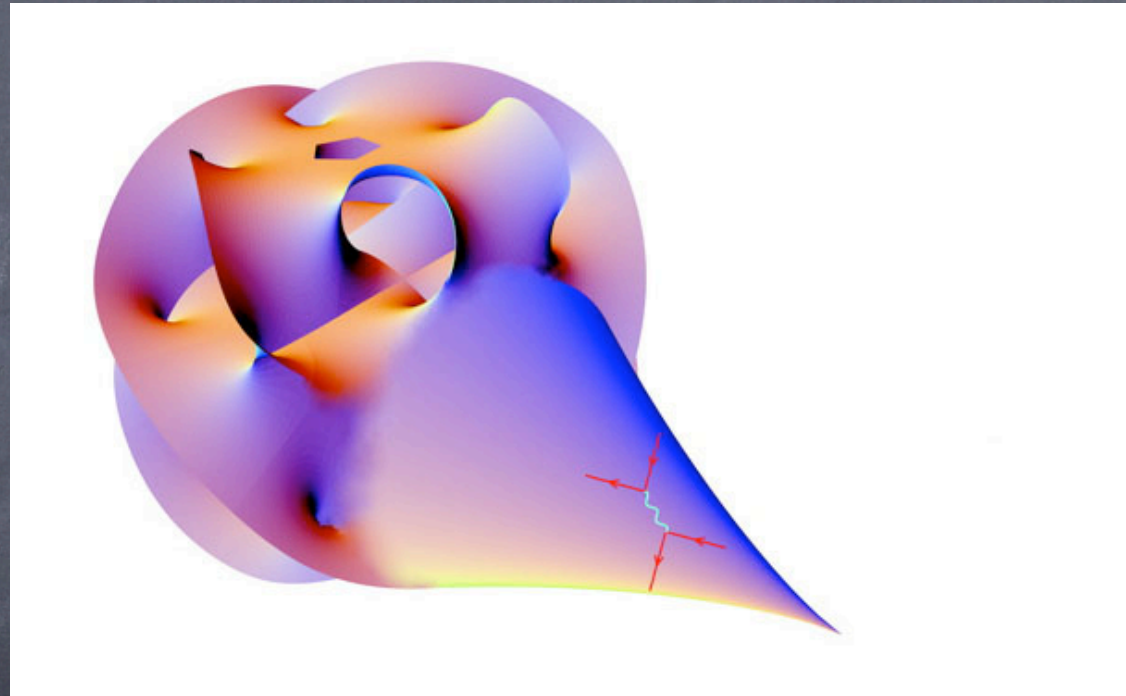
# Matrix Theory



Banks, Fischler, Shenker, Susskind

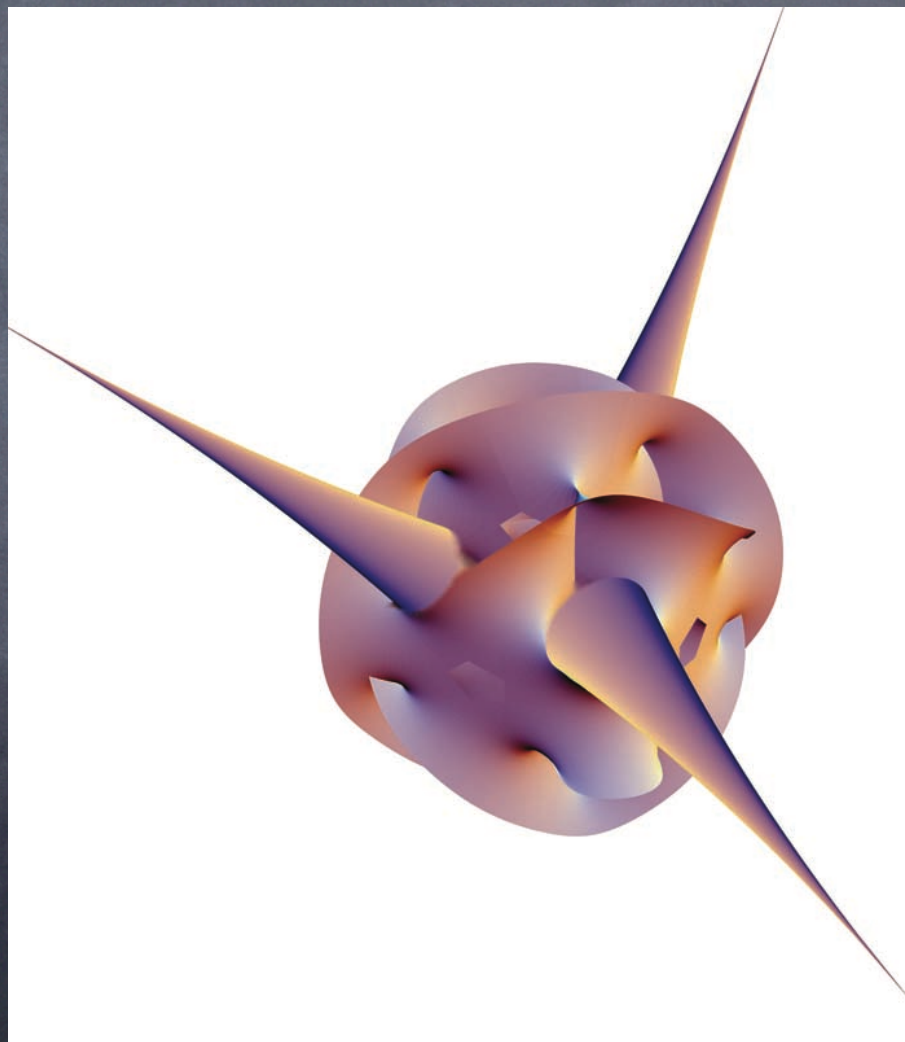
Close D0-branes don't have locations

# Calabi-Yau Thoats





# Calabi-Yau Thoats



# The Future

- **extra dimensions** have fascinated us for 100 years
- the hot problem now is the **origin of mass**
- **extra dimensions** provide new solutions
- in a few years the **Large Hadron Collider** will tell us **Nature's answer**