

II B theory has D3 branes

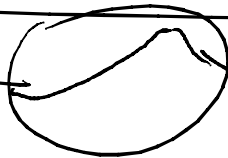
$$ds^2 = f^{-1/2} \left[-dt^2 + \sum_{i=1}^3 dx_i^2 \right] + f^{1/2} \left[dr^2 + r^2 d\Omega_5^2 \right]$$

$f = \left(1 + \frac{R^4}{r^4}\right)$; count degrees of freedom, then -

$r \gg R$, GRAVITONS + SUPER PARTNERS (

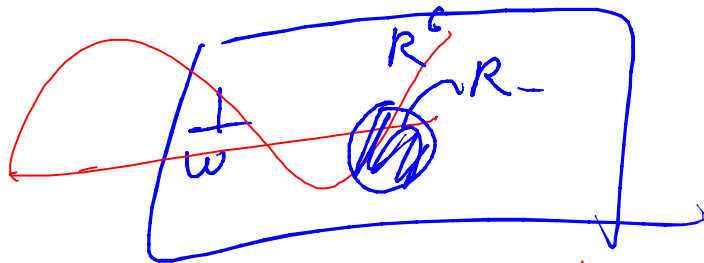
$r \ll R$. [EVERYTHING])

$r \gg R$



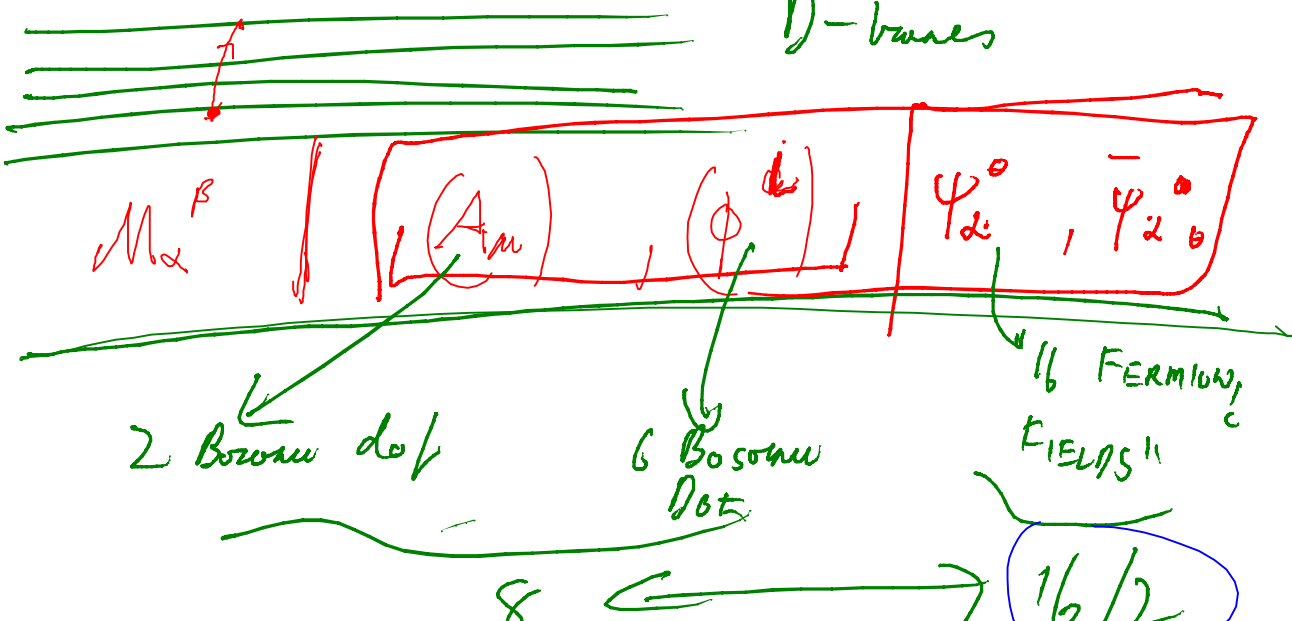
$r \ll R$

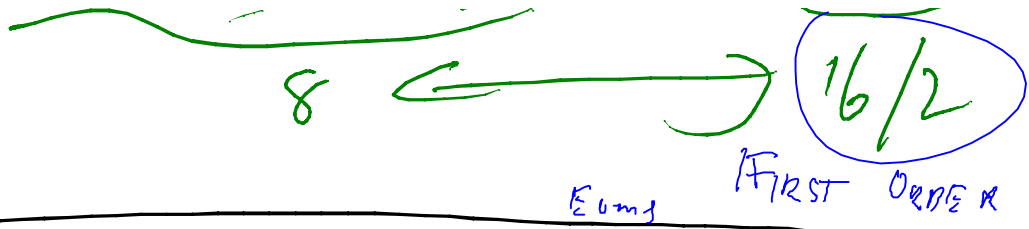
TRANS $\sim (wR)^4$



$wR \ll 1$; $\frac{1}{w} \gg 1$

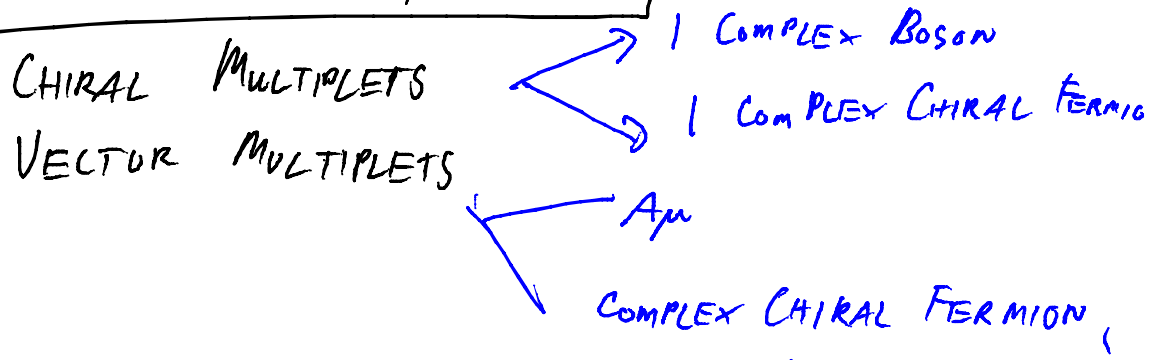
D-branes





$E_{U(1)}$

16 SUPERCHARGES ; $\mathcal{N} = 4$



3 CHIRAL MULTIPLETS $\sim \psi^i$ ($i=1 \dots 3$)

1 VECTOR MULTIPLET $\sim W_{\mu}$

$$\int d^2\theta [W(\phi^i) + \# \text{Tr}(W_{\mu} W^{\mu})] + \int d^4\theta \bar{\psi}^i e^{V} \psi^i$$

$\hookrightarrow \propto \sum_{i \neq j} |\bar{\phi}_i \phi_j|^2$

POTENTIAL FROM D TERMS -

$$W \propto \text{Tr} [\phi_1, [\phi_2, \phi_3]]$$

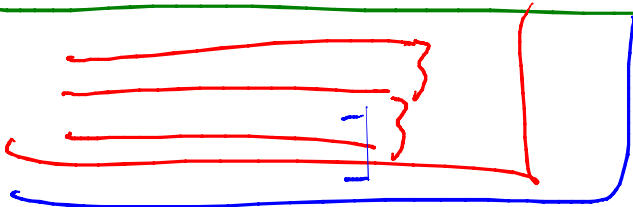
~~$V \propto \sum_{i \neq j} |\bar{\phi}_i \phi_j|^2$~~

$$W \propto \text{Tr} [\psi_1, [\psi_2, \psi_3]]$$

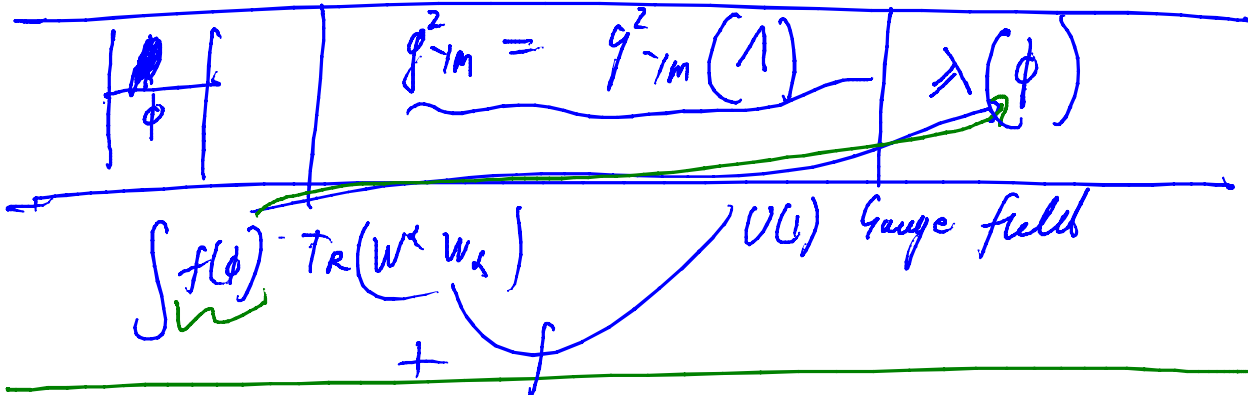
$$V = \sum_{i \neq j} |\bar{\phi}_i \phi_j|^2$$

SPACE OF ZERO ENERGY SOLUTIONS
 IS PARAMETERIZED BY 6 MUTUALLY
 COMMUTING ~~REAL~~ ^{HERMITEAN} REAL MATRICES

6 DIAGONAL MATRICES

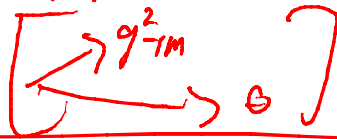


$SU(2)$ $N=4$ YANG MILLS THEORY



QUANTUM MECHANICALLY

COMPLEX PARAMETER LABELING THE THEORY



CONFORMAL GROUP

$SO(3,1)$ $(M_{\mu\nu})$ (LORENTZ)

P_μ (TRANSLATIONS)

D (SCALE TRANSFORMATIONS)

K_μ (SPECIAL CONFORMAL TRANSF)

$d\mu$

$\frac{\partial}{\partial \tilde{x}^\mu}$

$\tilde{x}^\mu = \left(\frac{1}{x^\mu}\right) = \frac{x^\mu}{x^2}$

1 5 0 5 ~ 1 1 1

$$\left[\begin{array}{l} \{\varphi, \varphi\} \sim \rho \\ \{S, S\} \sim \kappa \end{array} \right]$$

$$g_{YM}^2(\Lambda) \dots ; \Lambda = f(\tilde{\Lambda})$$

High Scale Lagrangian
Completed

