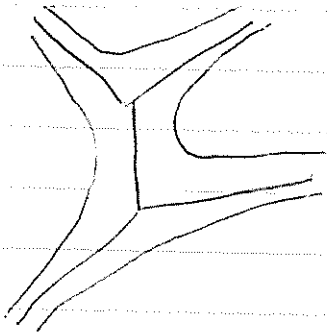



17 November 2006
M. Friedman and
E. Silverstein

A Math/Physics Happening

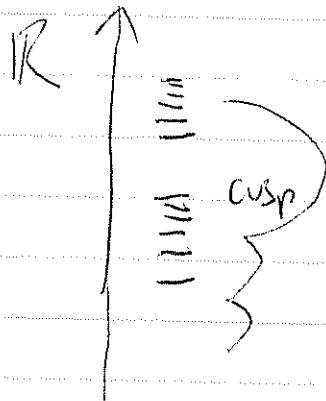
Old facts



Cusps \mathbb{Z} \mathbb{H} 

\mathbb{H} has Euclidean (similarity) structure

hyp volumes are well ordered



$\sum_{\text{hyp 3-man.}} e^{-\text{vol}(M)} \rightarrow \text{diverges.}$
 inj rad $>$ const

Maybe can fix

$$\sum e^{-\text{vol}(M)} (\log \text{vol}(M))^{1+\epsilon}$$

$n!$

Now know:

1. π_1 (3-manifolds)

↳ logic evaporates

2. Simple homotopy type \Leftrightarrow diffeomorphism

3. $\pi_1(M^3)$ is residually finite

Near complete

Space forms of "other 7"

plyticosm

Lots known

Volumes of hyp 3-manifolds:

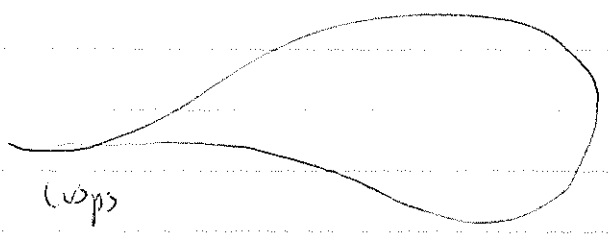
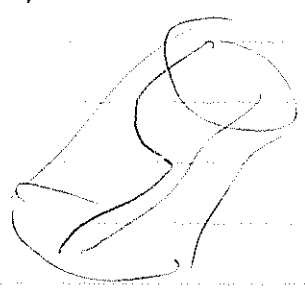
manifolds, unoriented manifolds, orbifold

cusped version

Metric space

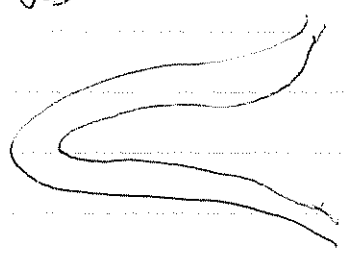


GH distance

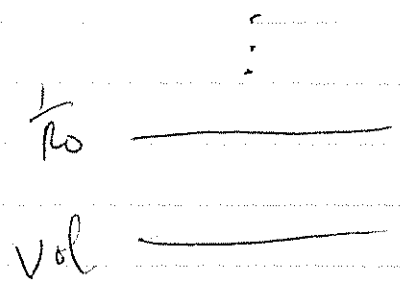


loops

$$ds^2 = dz^2 + e^{-z} ds_T^2$$



$M_3 \times M_3$

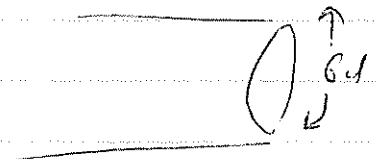


Vol, Coupling

$$\text{Vol} \leftrightarrow \rho = \rho(x_{4d})$$

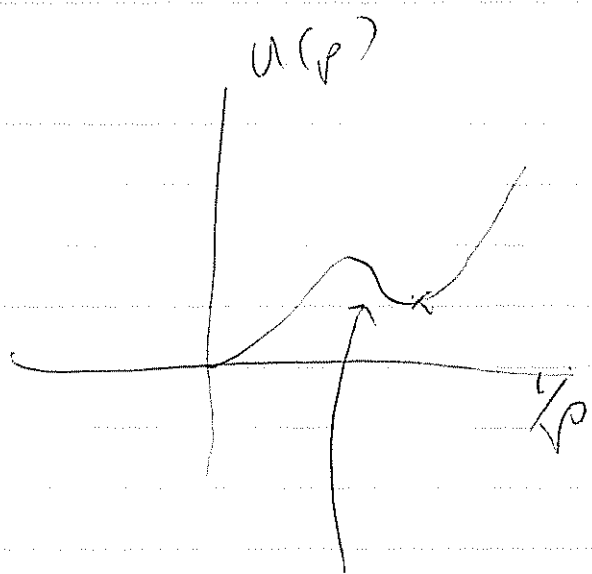
D=10

$$S_{10} = \int d^{10}x \sqrt{\det g} R$$

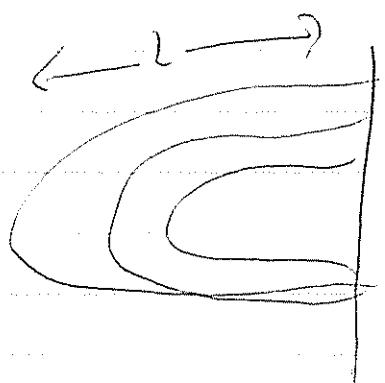


$$S_4 = \int d^4x \sqrt{\det g^{(4)}} \left((2\rho)^2 - u(\rho) \right)$$

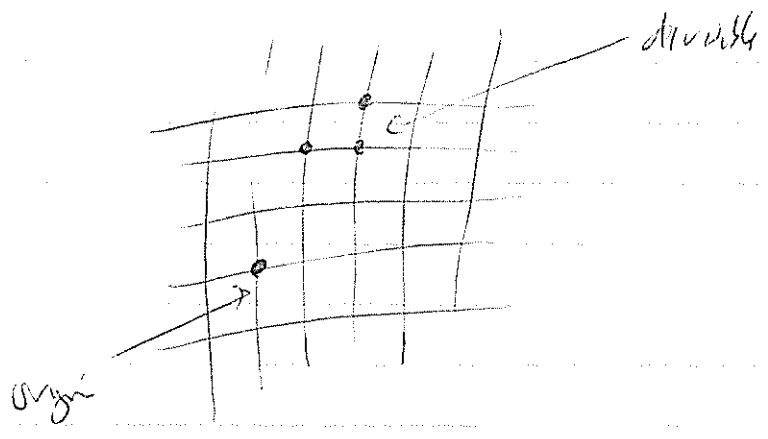
← 4d →



"orientifold"



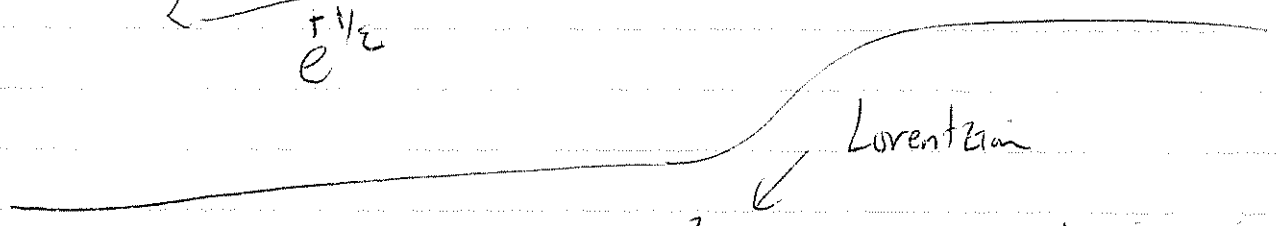
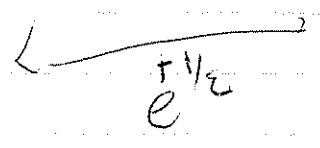
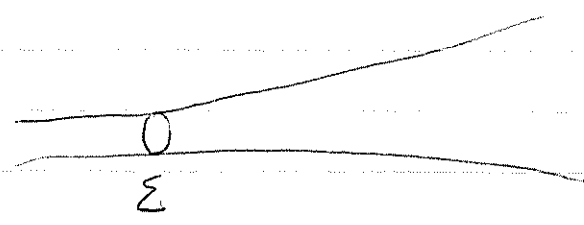
$$n(L) = ?$$



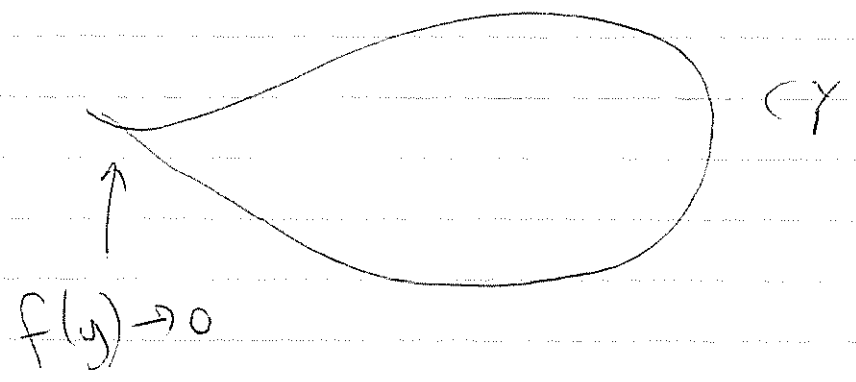
(p, y)

$$|p| + |y| = c$$

$$\text{depth} = c \text{ or } e^c$$

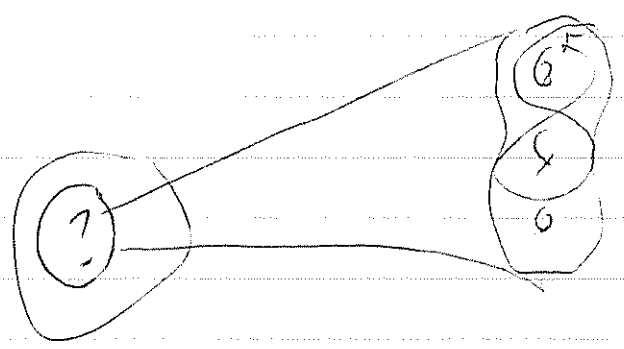


$$ds^2 = f(y) ds_{yd}^2 + g_{ij}(y) dy^i dy^j$$



Our 4d (3+1d)

$\nwarrow M_3$



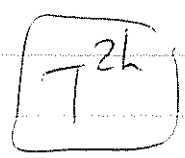
$$n(L) \sim e^{L/L_0}$$

$t \rightarrow$

Riemann surface of genus h

$T^{2h} =$ Jacobian

$T(x)$



\rightarrow Riemann surface

