

Geometry
Gravity
BHs
String theory
horizons

thermo
-dynamics
← QFT
stat. mech.
:
:

Unsolved Counting Problem

1.) Explain the universality
of the area law

(a) 1 D.O.F. / $L_p^2 \Rightarrow$ area law

(b) Ent. \propto Area \rightarrow Suskind & Uglow
 $\frac{\text{Area}}{4G} \rightarrow$ divergence

Hawking, Maldacena,
Strominger

Sachson, Fiola, Preskill
Strominger, Trivedi
Takayanagi

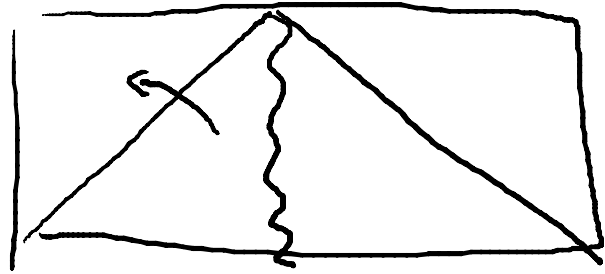
c) Carlip

Kabat

c) Carlip

Kabat

2. Explain $\Sigma_{BH}(dS)$



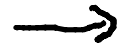
(a) Stringy dS solution (Silverstein)

(b) $AdS/dFT \rightarrow dS/dFT$

3. Explain SBH (Schwarz)
Correspondence principle
Horowitz & Polchinski



string states



BHs

4. Explain SBH (extremal Kerr)



Extremal : $J = M^2$

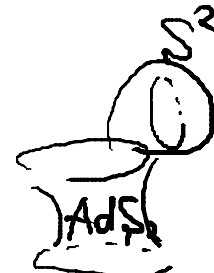
$T_H \rightarrow 0$

(a) M theory duality chain \rightarrow D6-D0

Horowitz & Roberts

(b) Bardeen - Horowitz

No horizon region has $SL(2, R) \times U(1)$



$AdS_3 \Rightarrow CFT ?$

$$S_{\text{ent}}(\text{Kerr}) = 12\pi J$$

$$S_{\text{micro}} = 2\pi \sqrt{cL_0 + 36J^2}$$

5. Explain S_{BH} (extremal
non-SUSY BHs)

(1) Sen & Trivedi

non-SUSY attractors

(2) secret AdS_3

6. M-theory on CY \rightarrow 5D

wrap M2 branes \rightarrow BH

$AdS_2 \times S^3$ near horizon

(1) AdS_2 has graviphoton

$\Rightarrow AdS_3 / \mathbb{Z}$ Guica, Strominger

(2) AdS_2 / CFT