

HOMEWORK

1- CONSIDER AdS_2 . AS.

$$-X_{-1}^2 - X_0^2 + X_1^2 = -1$$

$$ds^2 = dX_\mu dX^\mu = -dx_{-1}^2 - dx_0^2 + dx_1^2$$

- POINCARÉ: $X_{-1} + X_1 = \frac{1}{z}$; $X_0 = \frac{t}{z}$

- GLOBAL $X_{-1} + iX_0 = \alpha \rho e^{i\tau}$.

a) FIND THE METRICS.

b) FIND THE GEODESICS.

HARDER → ** c) FIND THE ~~SO~~ KILLING VECTORS FOR THE $SO(2,1)$ ISOMETRIES IN GLOBAL COORDINATES

** d) WRITE THE WAVE EQN FOR A MASSIVE SCALAR FIELD ϕ IN GLOBAL ~~POINCARÉ~~ COORDINATES. FIND THE LOWEST ENERGY STATE.
→ HOW DO THE SYMMETRIES ACT

e) SOLVE THE WAVE EQUATION IN POINCARÉ COORDINATES

$$ds^2 = -\frac{dt^2 + dz^2}{z^2}$$

• FIND THE SCALING

EXPONENTS -

f) EVALUATE THE ACTION FOR FIXED BOUNDARY CONDITIONS FOR A MASSLESS FIELD ϕ & COMPARE WITH THE SAME PROBLEM FOR dS_2 .