Title: Introduction to Ads Space

Date: Jul 21, 2016 06:30 PM

URL: http://pirsa.org/16070077

Abstract:

AdS_{d+1} Surface $-X_{-1}^2 - X_0^2 + X_1^2 + \dots + X_d^2 = -\ell^2$

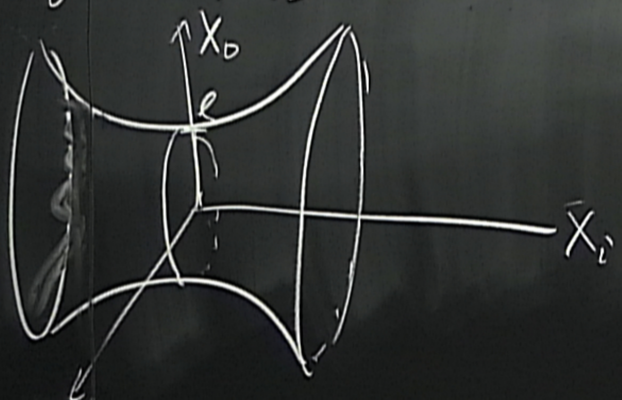
$SO(d,2)$ embedded in $ds^2 = -dX_{-1}^2 - dX_0^2 + dX_1^2 + \dots + dX_d^2$

$$\rightsquigarrow ds^2 = -\left(\frac{r^2}{\ell^2}+1\right)dt^2 + \frac{dr^2}{\frac{r^2}{\ell^2}+1} + r^2\, d\Omega_{d-1}^2$$

$r \in [0,\infty)$

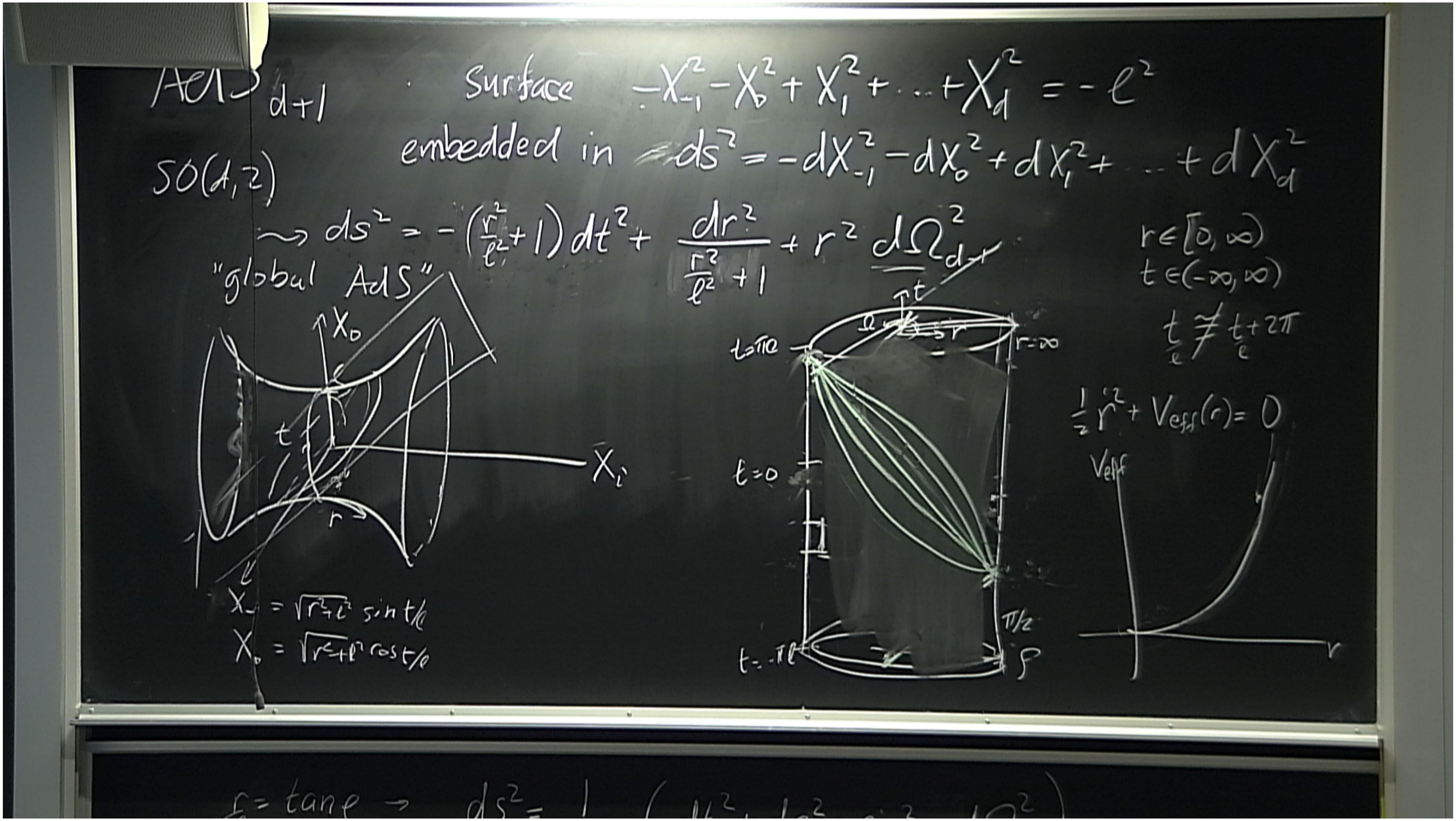
$t \in (-\infty,\infty)$

"global AdS"

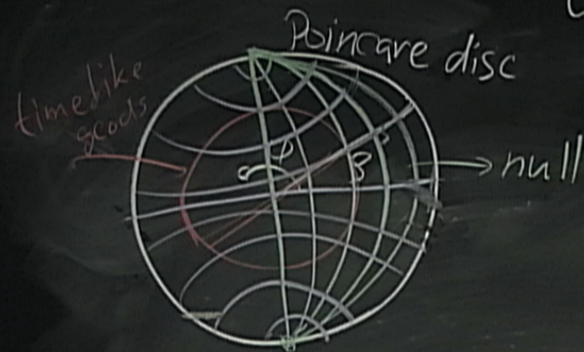


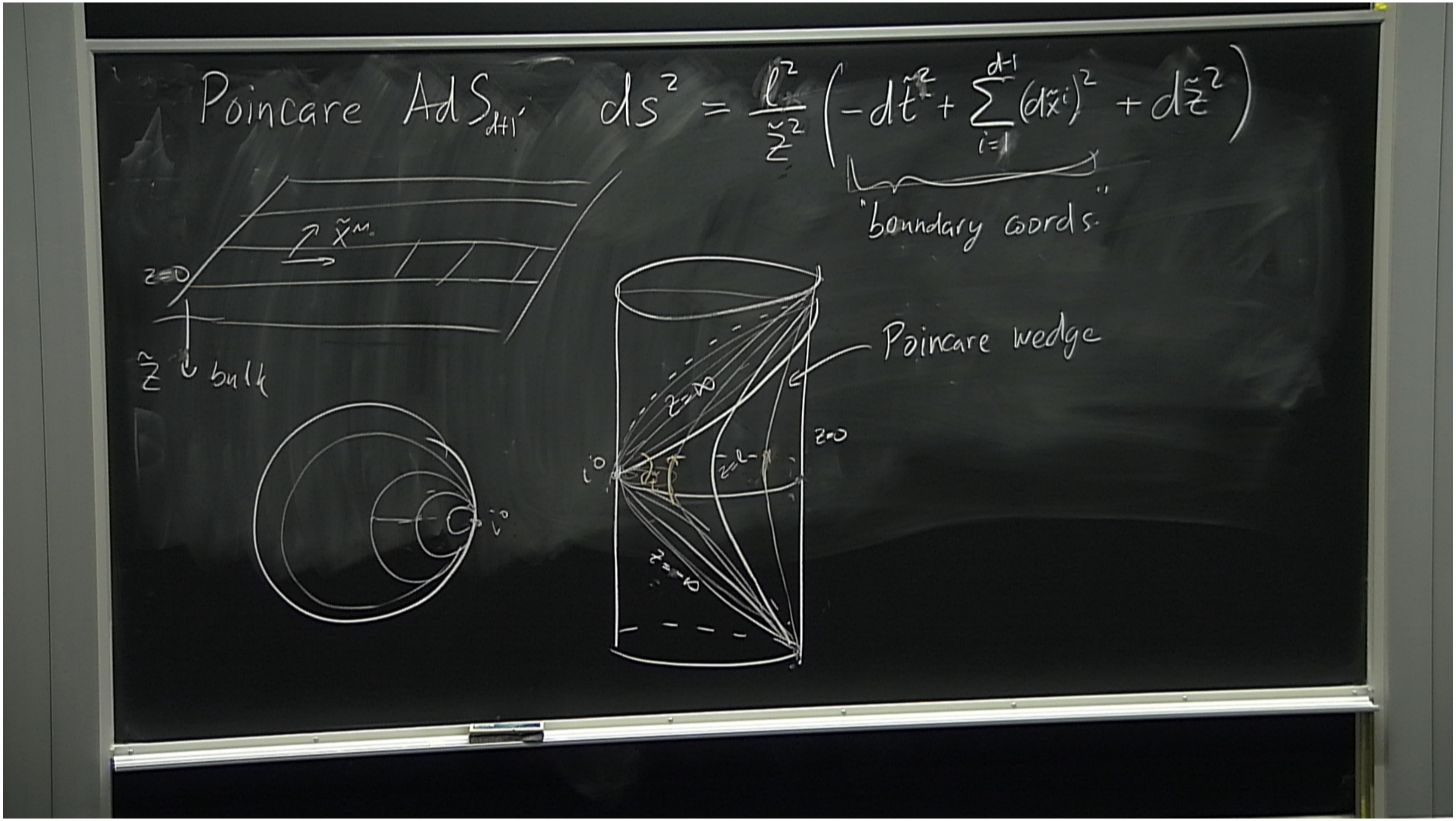
$X_{-1} = \sqrt{r^2+\ell^2}\,\sin t/\ell$

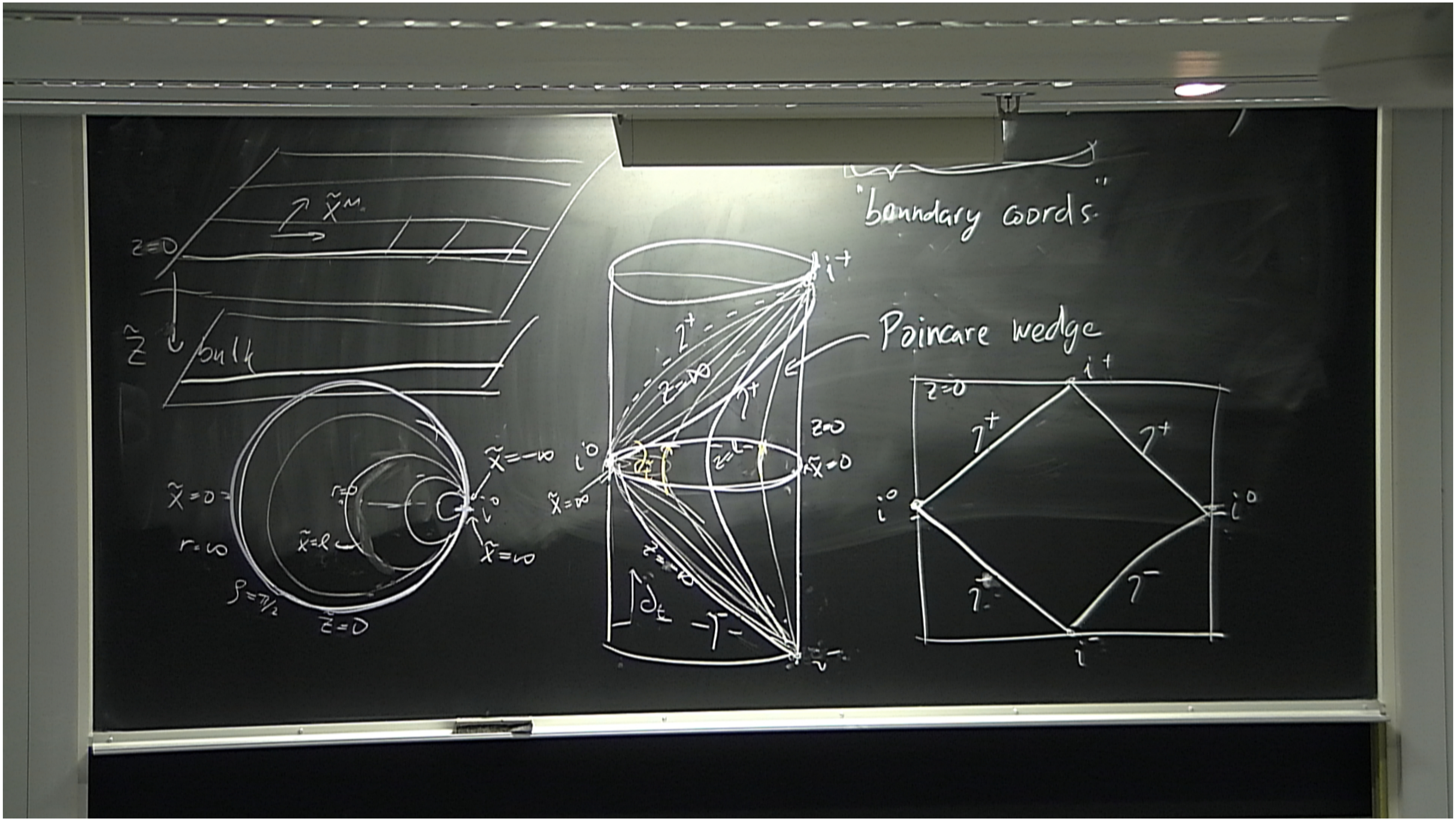
$X_0 = \sqrt{r^2+\ell^2}\,\cos t/\ell$

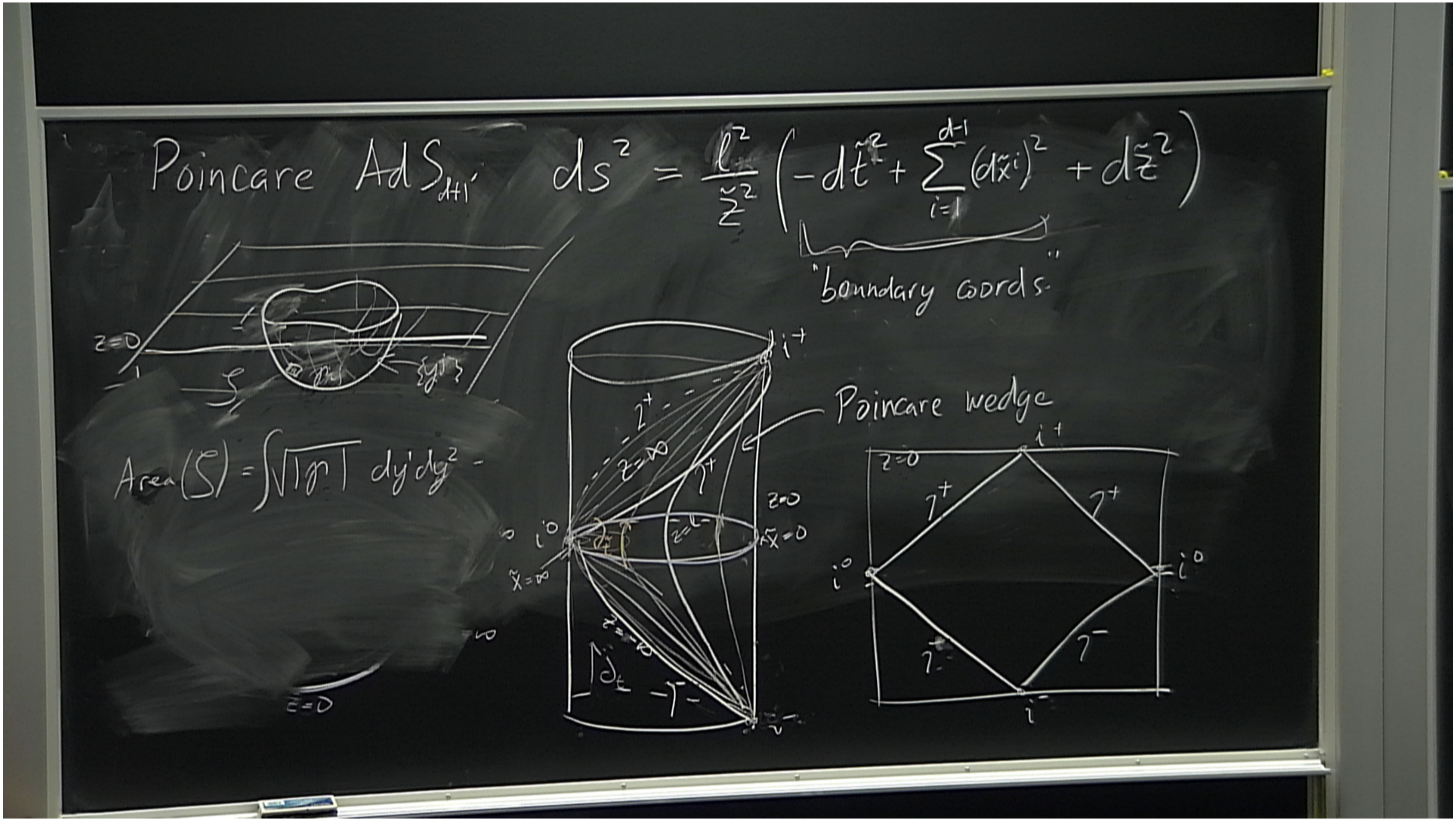

AdS$_{d+1}$
Surface $-X_{-1}^2 - X_0^2 + X_1^2 + \dots + X_d^2 = -\ell^2$
embedded in $ds^2 = -dX_{-1}^2 - dX_0^2 + dX_1^2 + \dots + dX_d^2$
SO(d,2)
$\rightsquigarrow ds^2 = -\left(\frac{r^2}{\ell^2}+1\right)dt^2 + \frac{dr^2}{\frac{r^2}{\ell^2}+1} + r^2 d\Omega_{d-1}^2$
"global AdS"
$r \in [0,\infty)$
$t \in (-\infty,\infty)$
$\frac{t}{\ell} \not\equiv \frac{t}{\ell} + 2\pi$
$\frac{1}{2}\dot{r}^2 + V_{eff}(r) = 0$
V_{eff}
r
X_0
X_i
t
r
ℓ
$X_{-1} = \sqrt{r^2+\ell^2}\,\sin t/\ell$
$X_0 = \sqrt{r^2+\ell^2}\,\cos t/\ell$
t
Ω
r
$t = \pi\ell$
$r = \infty$
$t = 0$
$\pi/2$
$t = -\pi\ell$
ρ

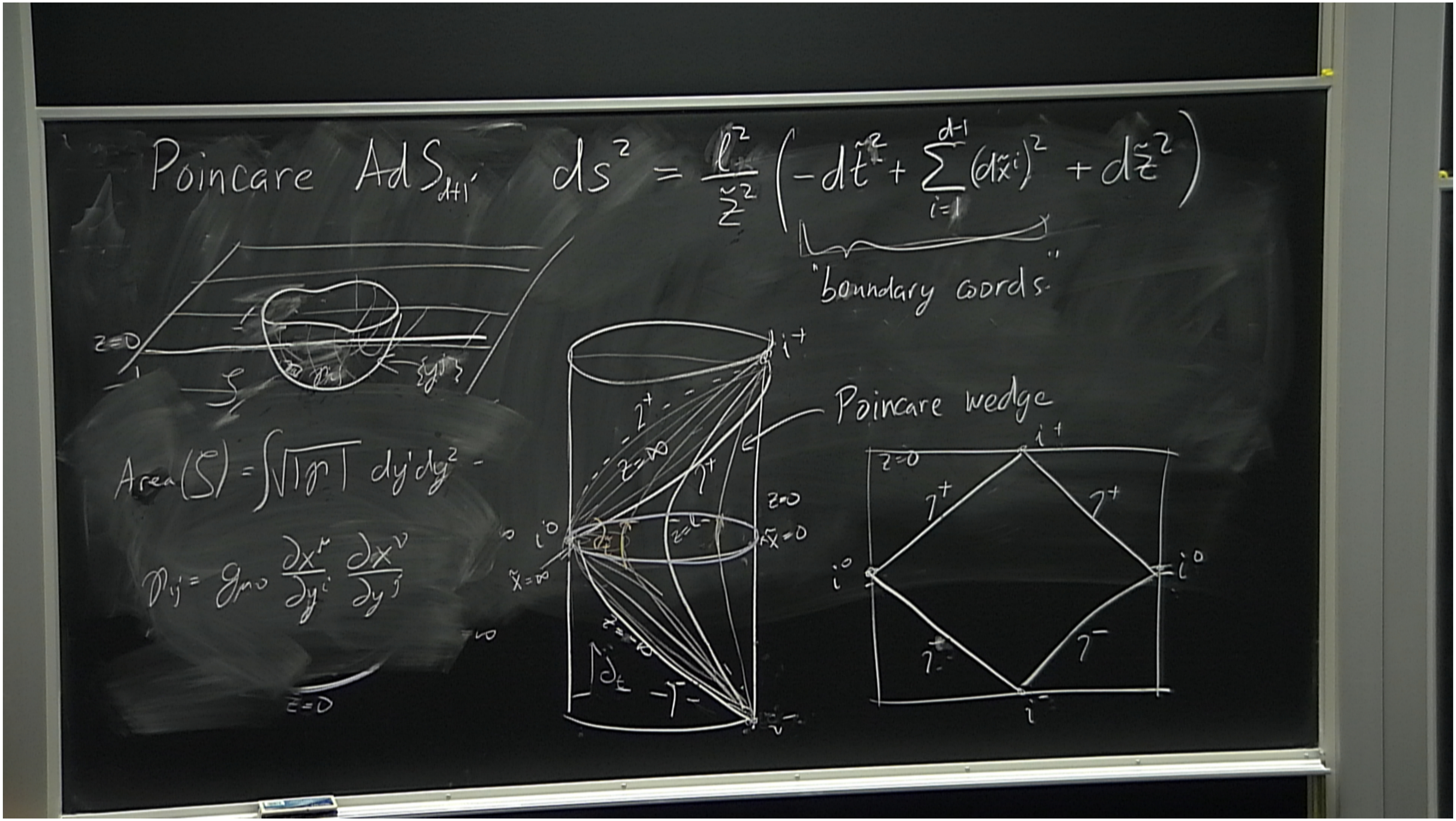
$$\frac{r}{\ell} = \tan\rho \rightarrow \quad ds^2 = \frac{1}{\cos^2\rho}\left(-dt^2 + d\rho^2 + \sin^2\rho \, d\Omega^2\right)$$




Poincare AdS_{d+1}
$ds^2 = \frac{\ell^2}{\tilde{z}^2}\left(-d\tilde{t}^2 + \sum_{i=1}^{d-1}(d\tilde{x}^i)^2 + d\tilde{z}^2\right)$
"boundary coords"
$\tilde{x}^\mu$
z=0
$\tilde{z}$ bulk
i^0
Poincare wedge
z=∞
z=0
z=-∞


"boundary coords"
Poincare wedge
z=0
bulk
r=∞
ρ=π/2
i⁺
i⁰
i⁻
z=∞
z=-∞
z=0
x=0
x=∞
x=-∞


Poincare AdS_{d+1}
$ds^2 = \frac{\ell^2}{\tilde z^2}\left(-d\tilde t^2 + \sum_{i=1}^{d-1}(d\tilde x^i)^2 + d\tilde z^2\right)$
"boundary coords"
$z=0$
Σ
$\{y^i\}$
$\mathrm{Area}(\Sigma) = \int \sqrt{|\gamma|}\, dy^1 dy^2$
i^+
i^0
i^-
$\mathcal{I}^+$
$\mathcal{I}^-$
$z=\infty$
$\tilde x=\infty$
$\tilde x=0$
∂_t
Poincare wedge


Poincare AdS_{d+1},
ds^2 = l^2/z̃^2 (-dt̃^2 + Σ_{i=1}^{d-1} (dx̃^i)^2 + dz̃^2)
"boundary coords"
Poincare wedge
Area(Σ) = ∫√|γ| dy^1 dy^2
γ_ij = g_μν ∂x^μ/∂y^i ∂x^ν/∂y^j
z=0
i^+
i^0
i^-
z=∞
x̃=∞
x̃=0