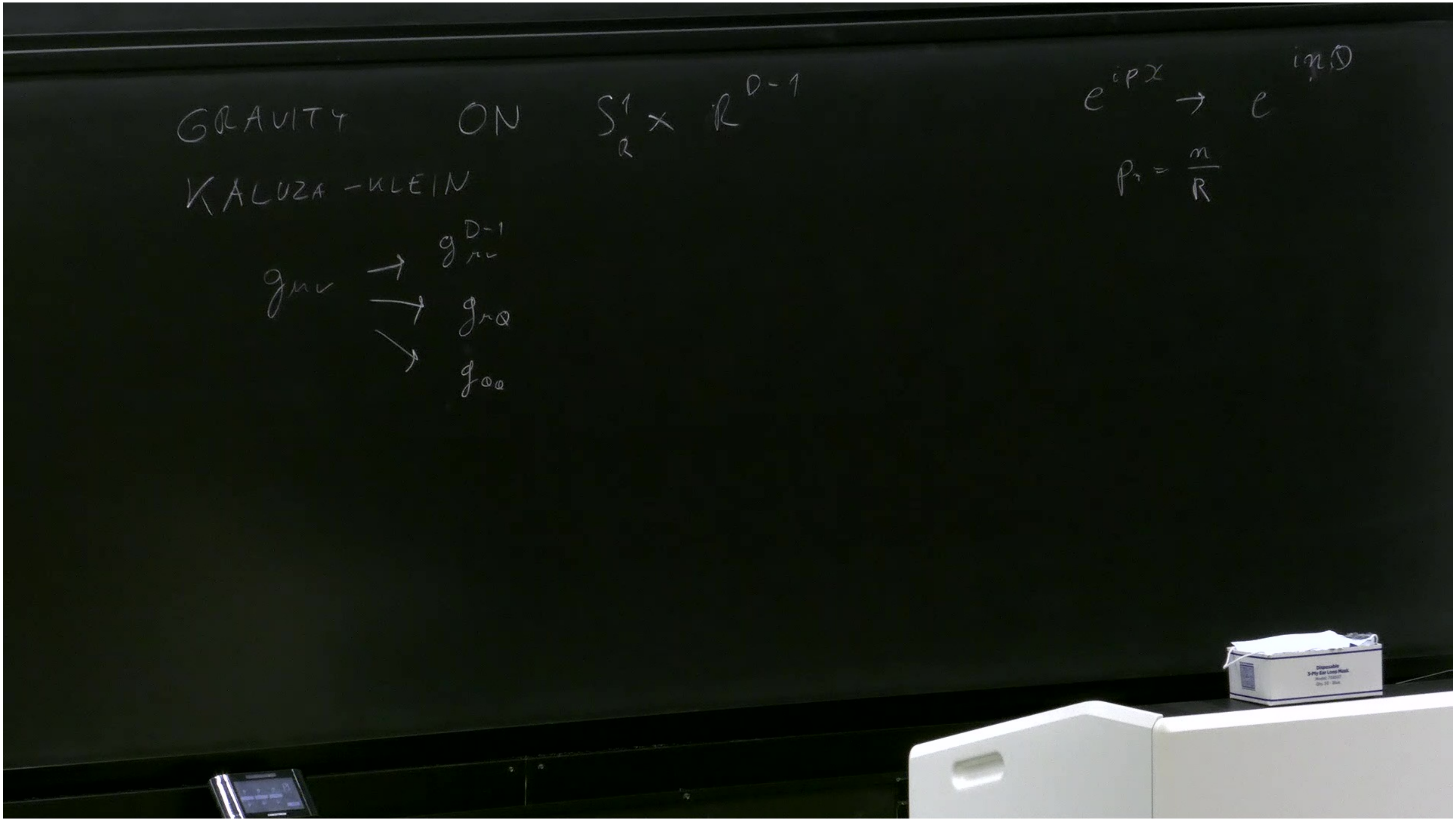
Title: String Theory Lecture

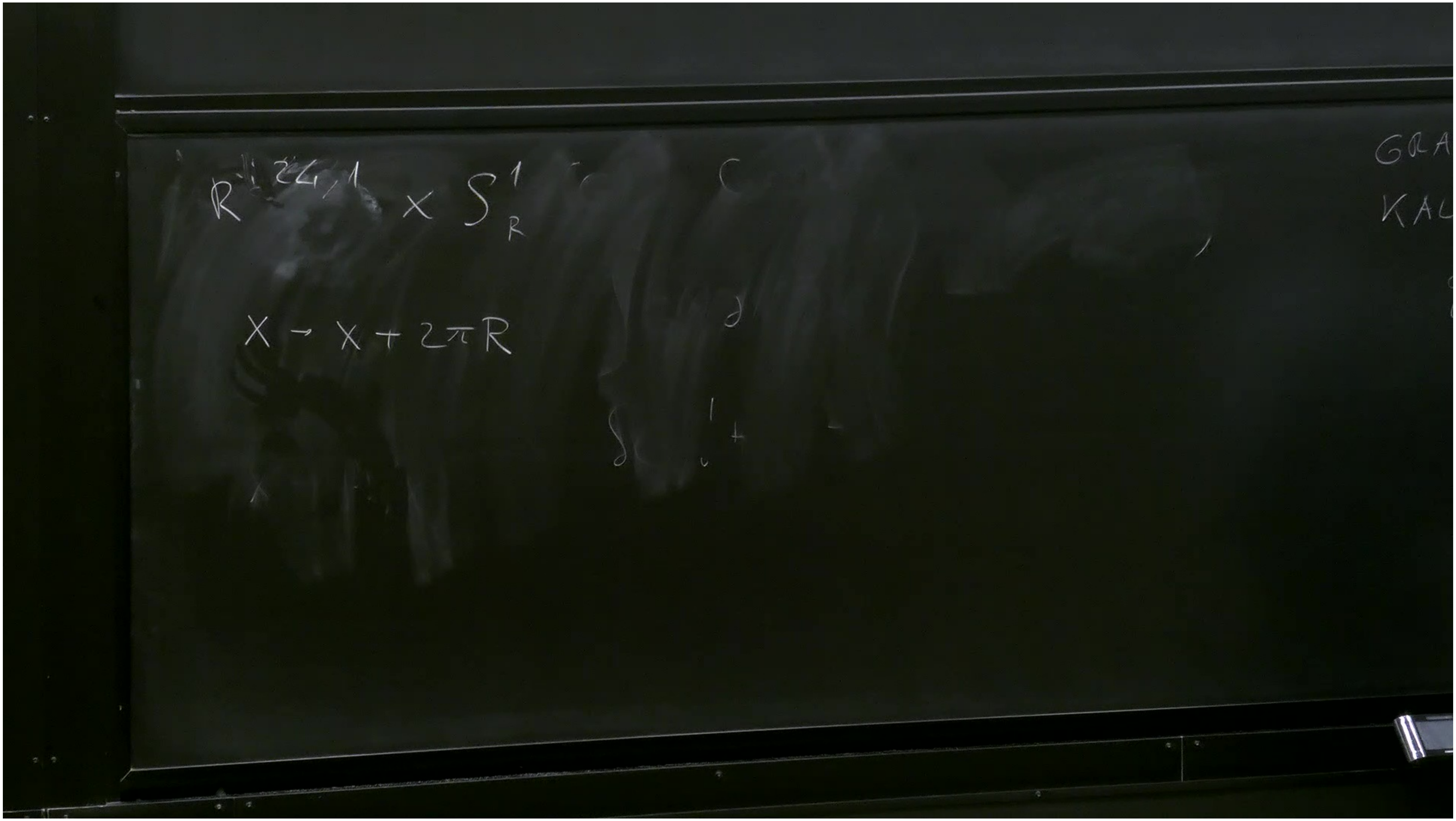
Speakers: Davide Gaiotto

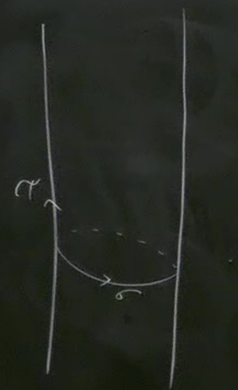
Collection: String Theory 2023/24

Date: April 29, 2024 - 10:15 AM

URL: https://pirsa.org/24040044


GRAVITY ON $S^1_R \times R^{D-1}$
KALUZA-KLEIN
$g_{\mu\nu} \to g^{D-1}_{\mu\nu}$
$\to g_{\mu\theta}$
$\to g_{\theta\theta}$
$e^{ipx} \to e^{in\theta}$
$p_x = \frac{n}{R}$


R^24,1 × S^1_R
X → X + 2πR
GRA
KAL



$$X \mapsto X + 2\pi R \qquad (\partial_\sigma^2 + \partial_\tau^2) X = 0$$

$$X(\sigma, \tau) = wR\sigma$$

$$X(\sigma,\tau) = x - 2ip\tau + wR\sigma + \sum_{n \neq 0} \frac{i}{n} a_n e^{in(\sigma + i\tau)} - \frac{i}{n} \bar{a}_n e^{-in(\sigma - i\tau)}$$

$$x = R\Theta \qquad p = \frac{n}{R}$$

$|n, w\rangle$

$a_{-n}|\ \rangle$

$\bar{a}_{-n}|\ \rangle$

$\vdots$

$$L_0 = \frac{1}{2}\left(\frac{n}{R} - \frac{Rw}{2}\right)^2$$

$$\bar{L}_0 = \frac{1}{2}\left(\frac{n}{R} + \frac{Rw}{2}\right)^2$$

"∂_σ" $\bar{L}_0 - L_0 = nw$

$e^{-in(\sigma - i\tau)}$

$p^2 + \frac{n^2}{2R^2} = 2$

KK TACHYON

$|n, 0\rangle \otimes |p\rangle$ $\quad$ $|0, w\rangle \otimes |p\rangle$

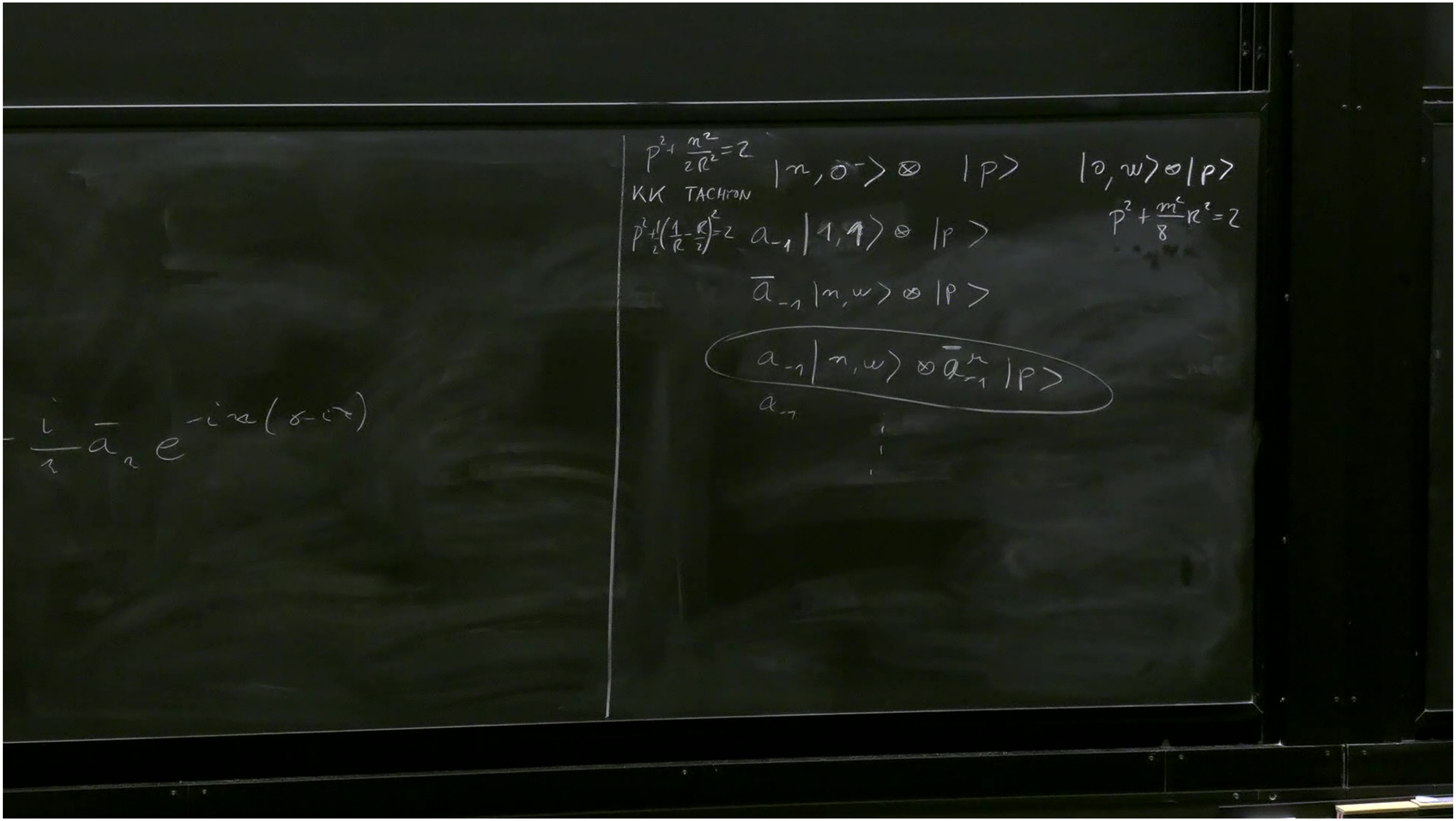
$p^2 + \frac{w^2}{8}R^2 = 2$

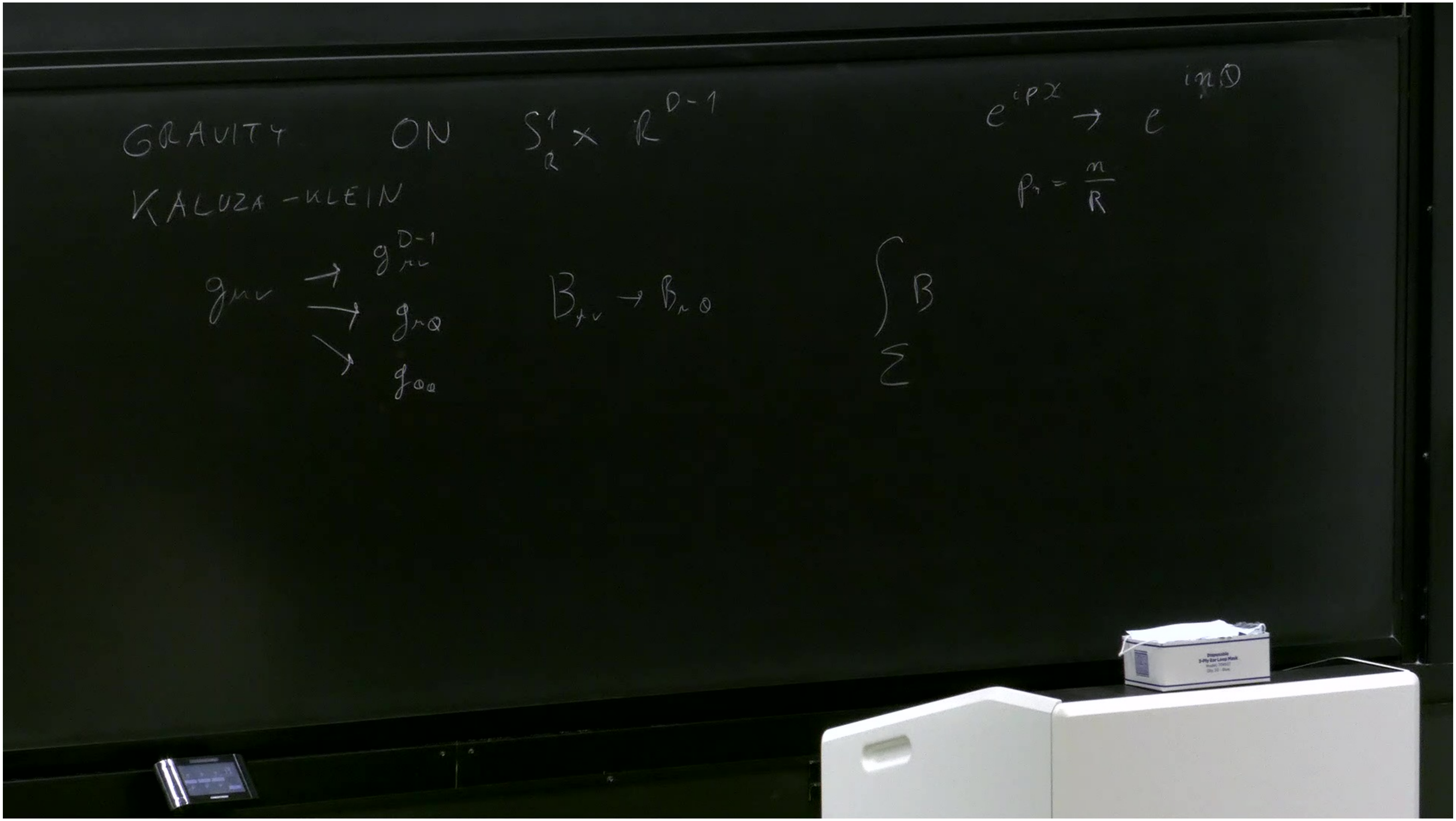
$a_{-1}|n, w\rangle \otimes |p\rangle$

$\bar{a}_{-1}|n, w\rangle \otimes |p\rangle$

$a_{-1}|n, w\rangle \otimes \bar{a}^{\mu}_{-1}|p\rangle$

$\vdots$


$p^2 + \frac{n^2}{2R^2} = 2$
$|n, 0\rangle \otimes |p\rangle$
$|0, w\rangle \otimes |p\rangle$
KK TACHYON
$p^2 + \frac{m^2}{8} R^2 = 2$
$p^2 + \frac{1}{2}\left(\frac{1}{R} - \frac{R}{2}\right)^2 = 2$
$a_{-1} |1, 1\rangle \otimes |p\rangle$
$\bar{a}_{-1} |n, w\rangle \otimes |p\rangle$
$a_{-1} |n, w\rangle \otimes \bar{a}^{\mu}_{-1} |p\rangle$
a_{-1}
$\frac{i}{n} \bar{a}_n e^{-in(\sigma - i\tau)}$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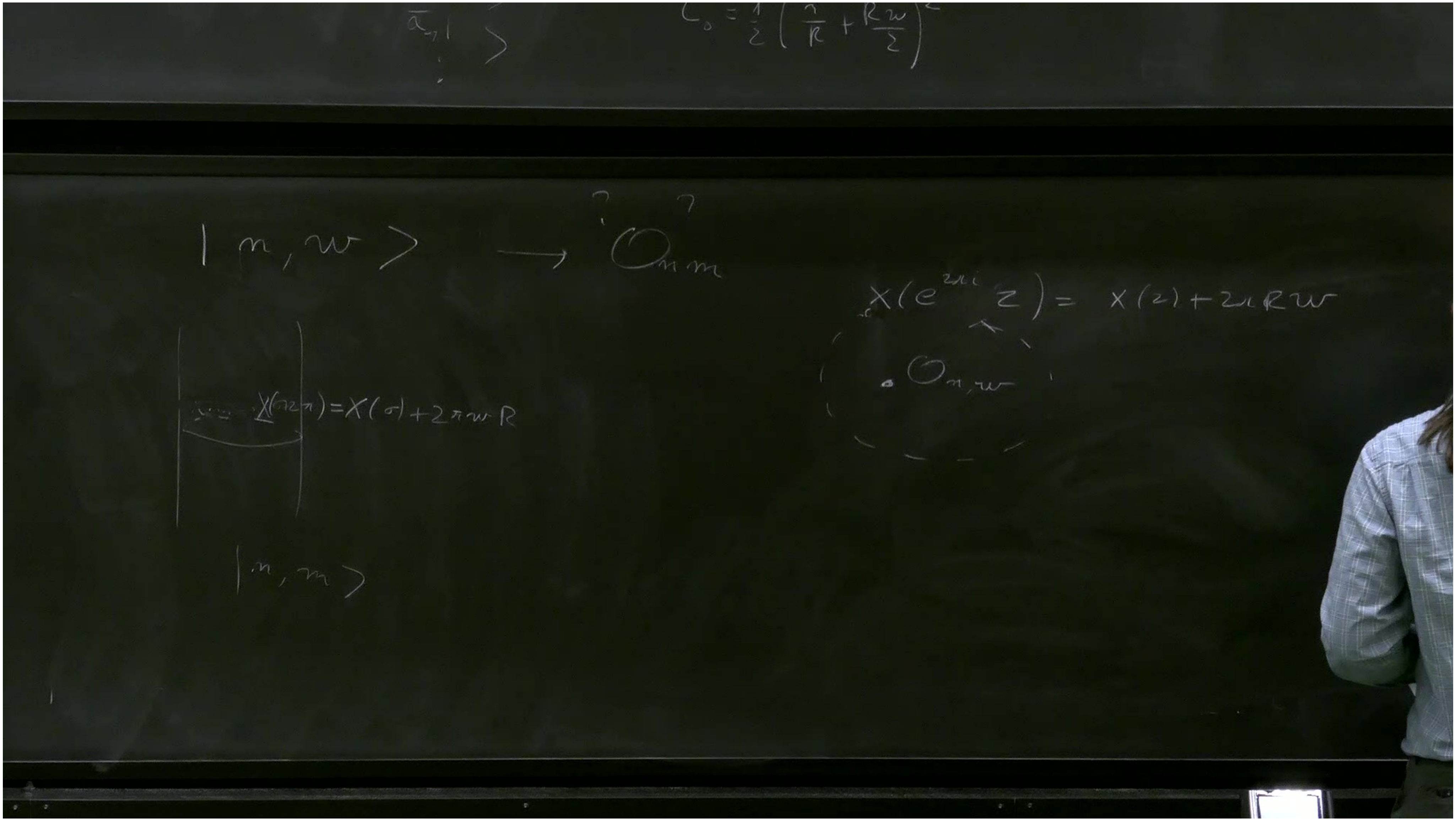
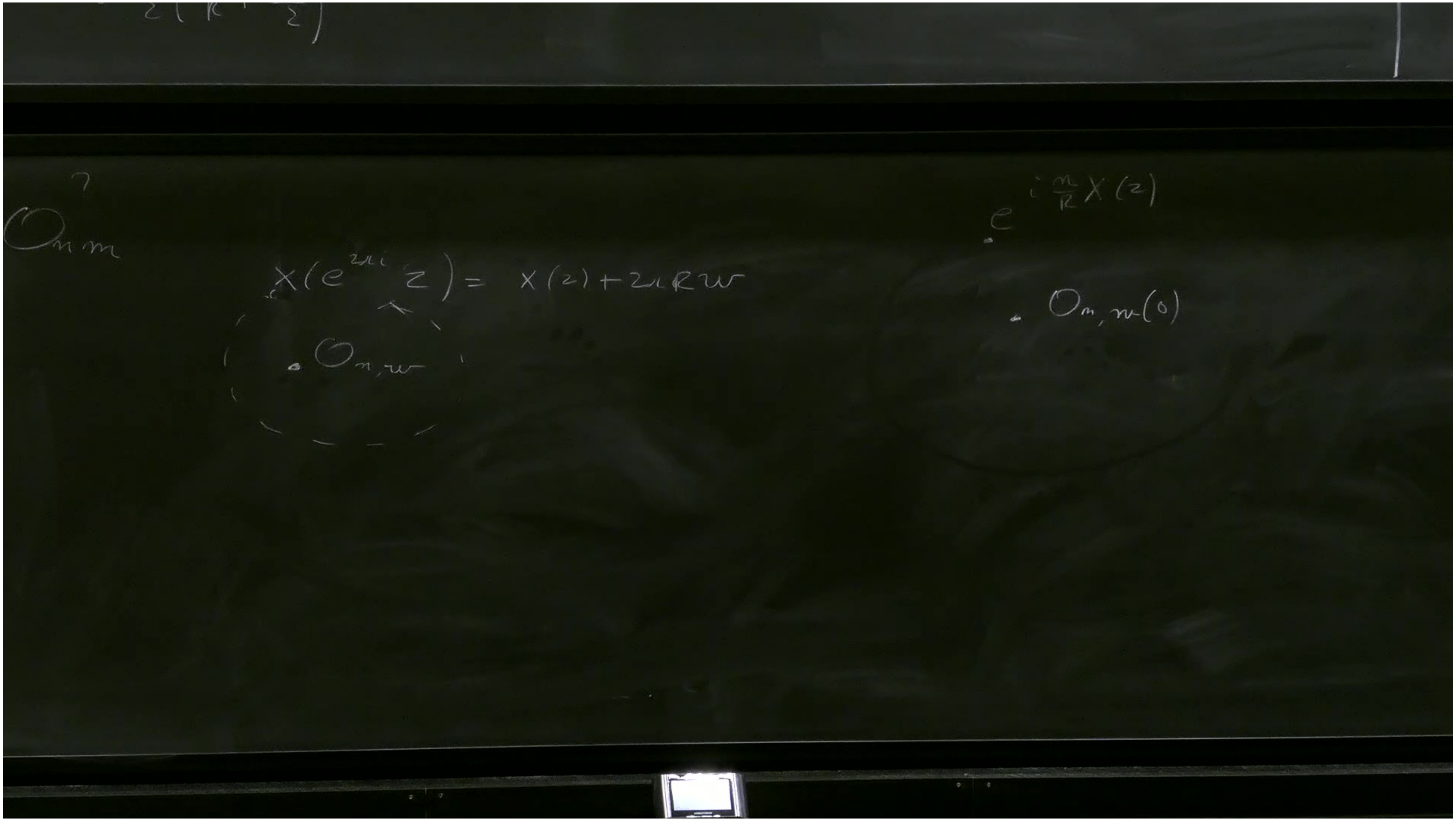
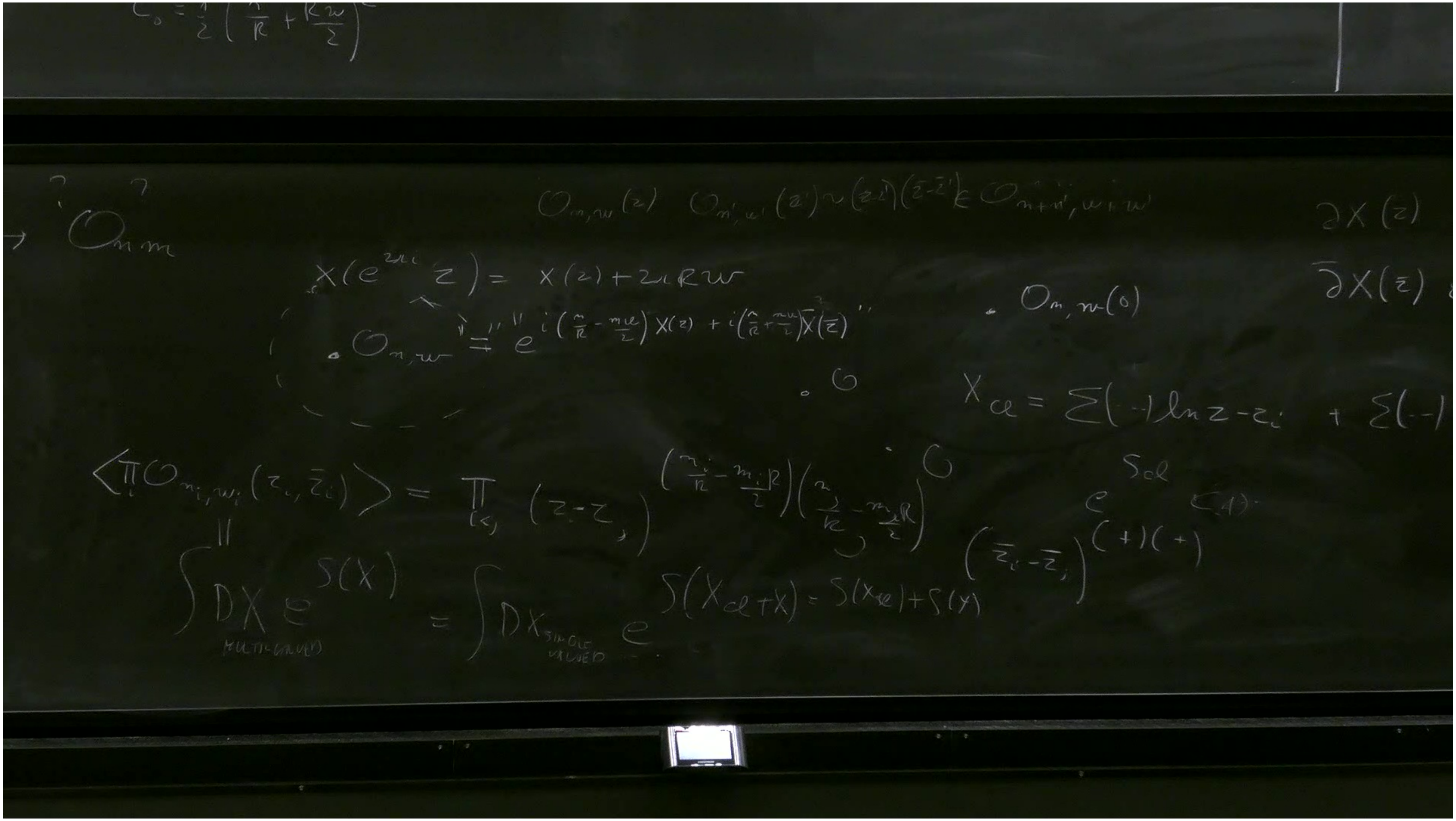
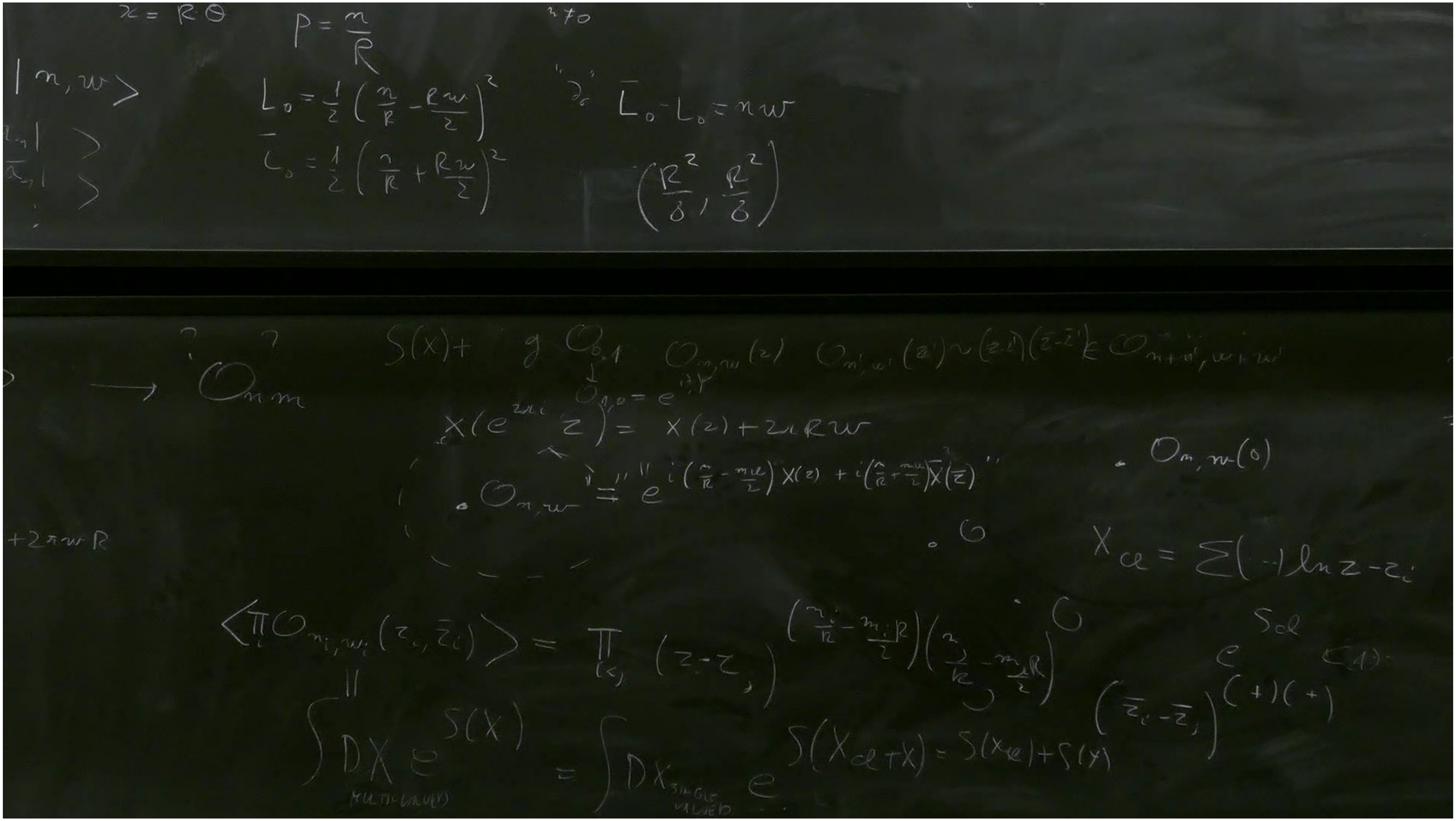
$\to g_{\mu\theta}$
$\to g_{\theta\theta}$
$B_{\mu\nu} \to B_{\mu\theta}$
$\int_\Sigma B$

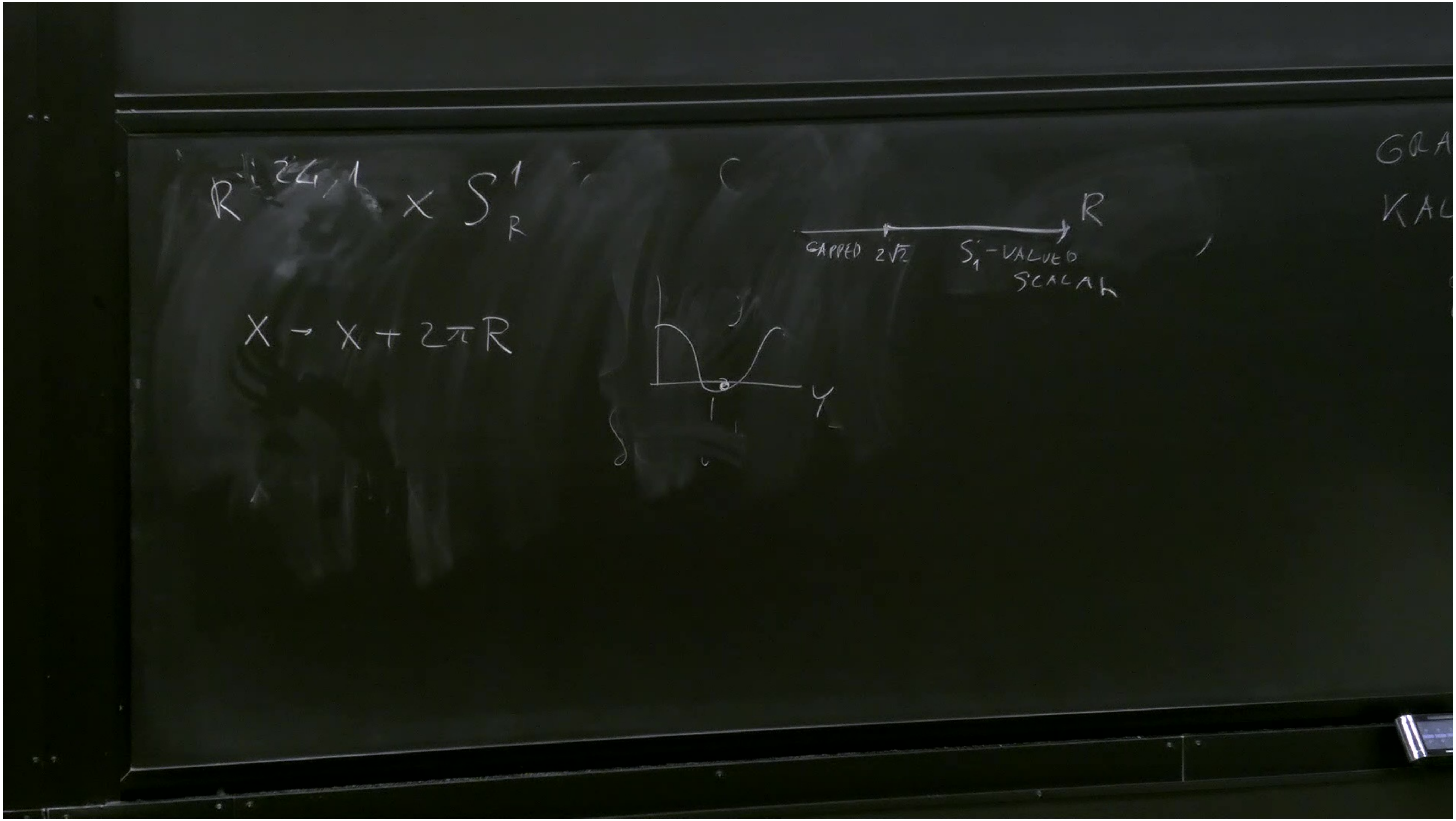


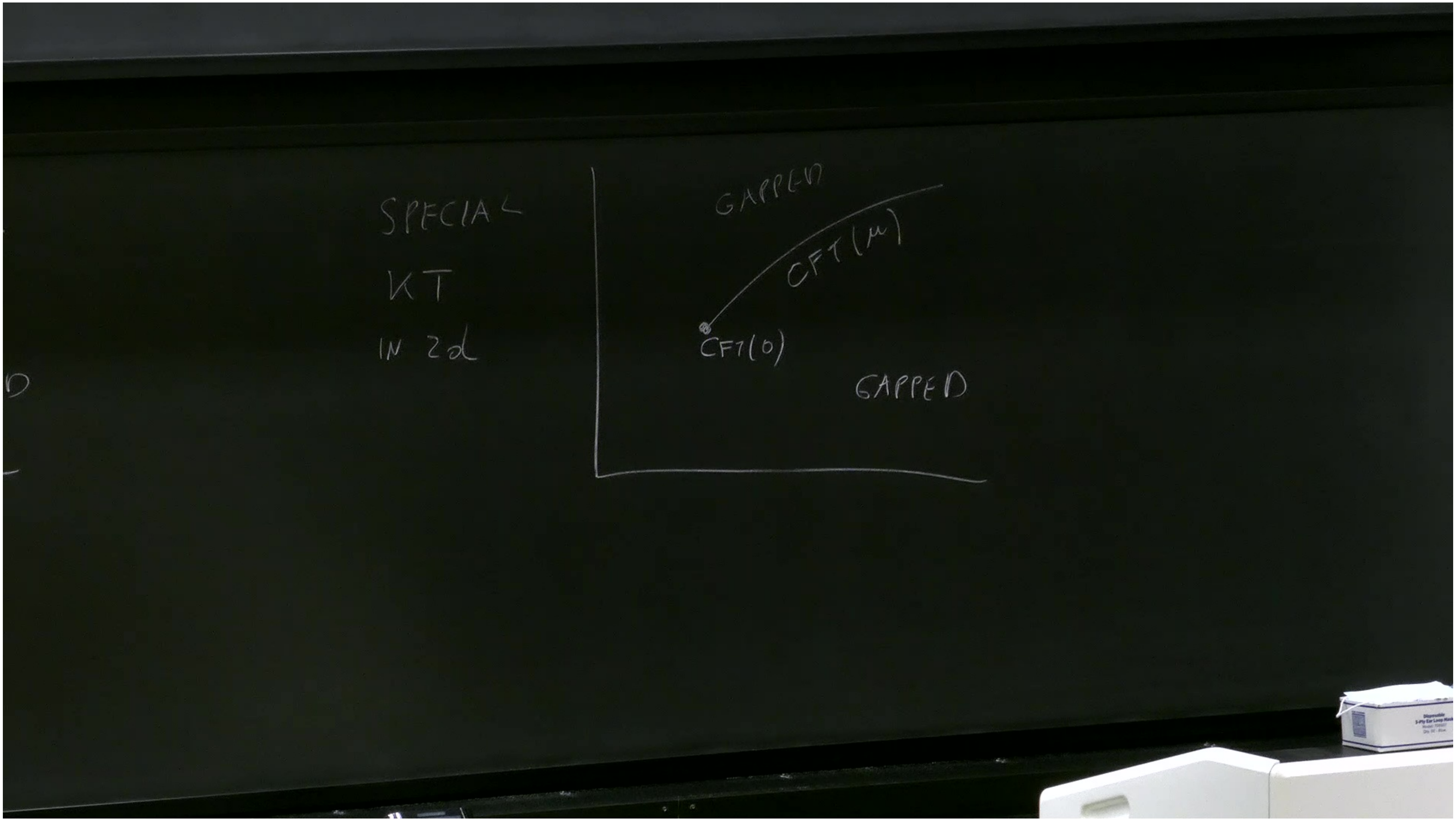
|n, w> → O_{n m}
X(e^{2πi} z) = X(z) + 2πRw
O_{n,w}
X(σ+2π) = X(σ) + 2πwR
|n, m>


?
O_{nm}
X(e^{2πi} z) = X(z) + 2πRw
O_{n,w}
e^{i (n/R) X(z)}
O_{m,w}(0)


X(e^{2πi} z) = X(z) + 2πRw
∂X(z)
∂̄X(z̄)
MULTIVALUED
SINGLE VALUED


MULTI-VALUED
SINGLE VALUED


$\times S^1_R$
$X \to X + 2\pi R$
R
GAPPED $2\sqrt{2}$
S^1-VALUED
SCALAR
Y


SPECIAL
KT
IN 2d
GAPPED
CFT(μ)
CFT(0)
GAPPED