Title: PSI 2015/2016 More/Beyond Standard Model - Lecture 15

Date: Mar 11, 2016 09:00 AM

URL: http://pirsa.org/16030044

Abstract:

RS: $ds^2 = \left(\frac{L_0}{z}\right)^2 \eta_{MN}\, dx^M dx^N = \left(\frac{L_0}{z}\right)^2 \left(\eta^{\mu\nu} dx^\mu dx^\nu - dz^2\right)$

$z = L_0$ $\qquad$ $z = L_1$

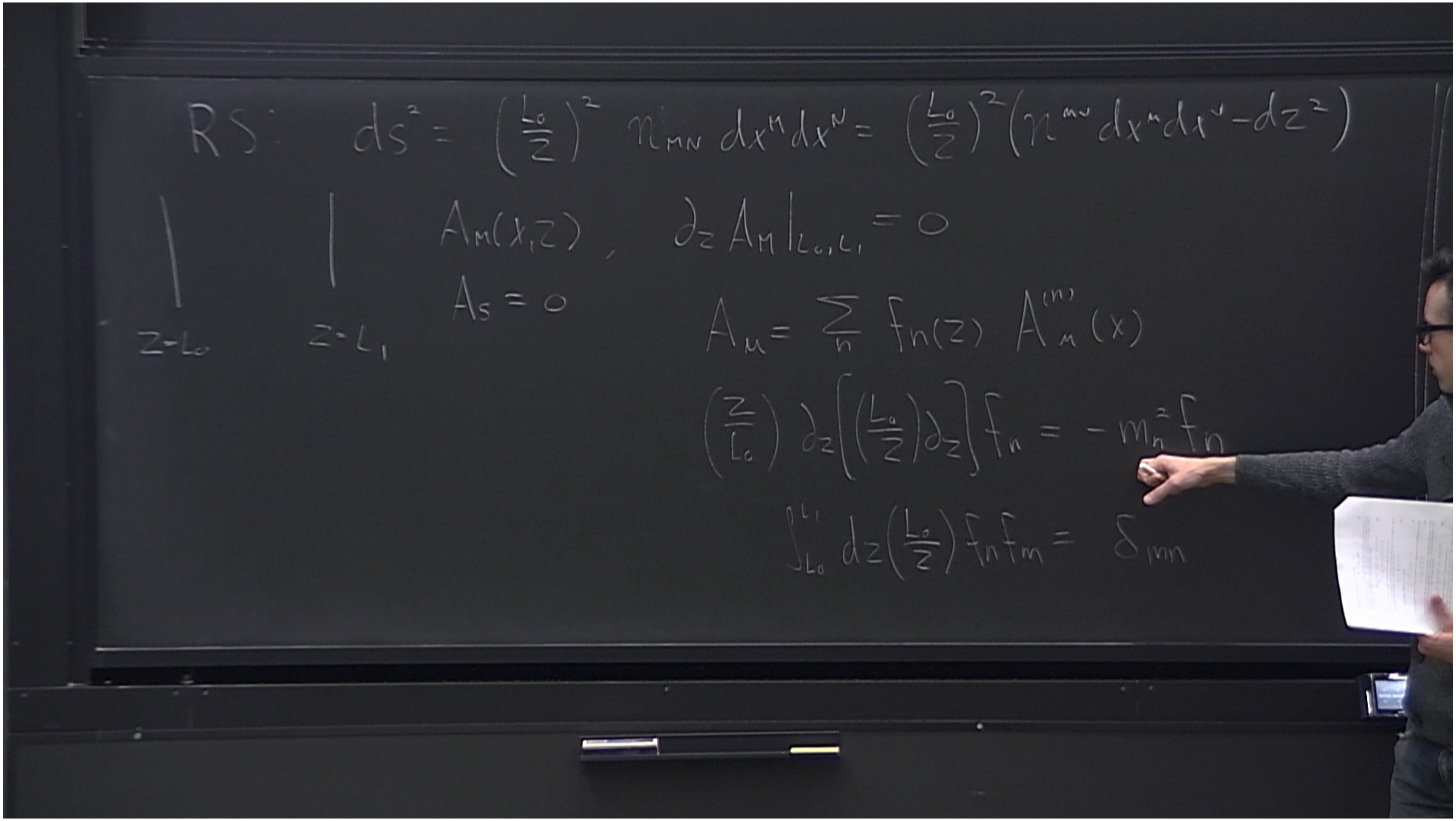
$A_M(x,z)$, $\quad \partial_z A_M \big|_{L_0, L_1} = 0$

$A_5 = 0$

$$A_\mu = \sum_n f_n(z)\, A^{(n)}_\mu(x)$$

$$\left(\frac{z}{L_0}\right) \partial_z \left[\left(\frac{L_0}{z}\right) \partial_z\right] f_n = - m_n^2 f_n$$

$$\int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right) f_n f_m = \delta_{mn}$$


RS: $ds^2 = \left(\frac{L_0}{z}\right)^2 \eta_{MN}\, dx^M dx^N = \left(\frac{L_0}{z}\right)^2 \left(\eta^{\mu\nu} dx^\mu dx^\nu - dz^2\right)$
$z=L_0$
$z=L_1$
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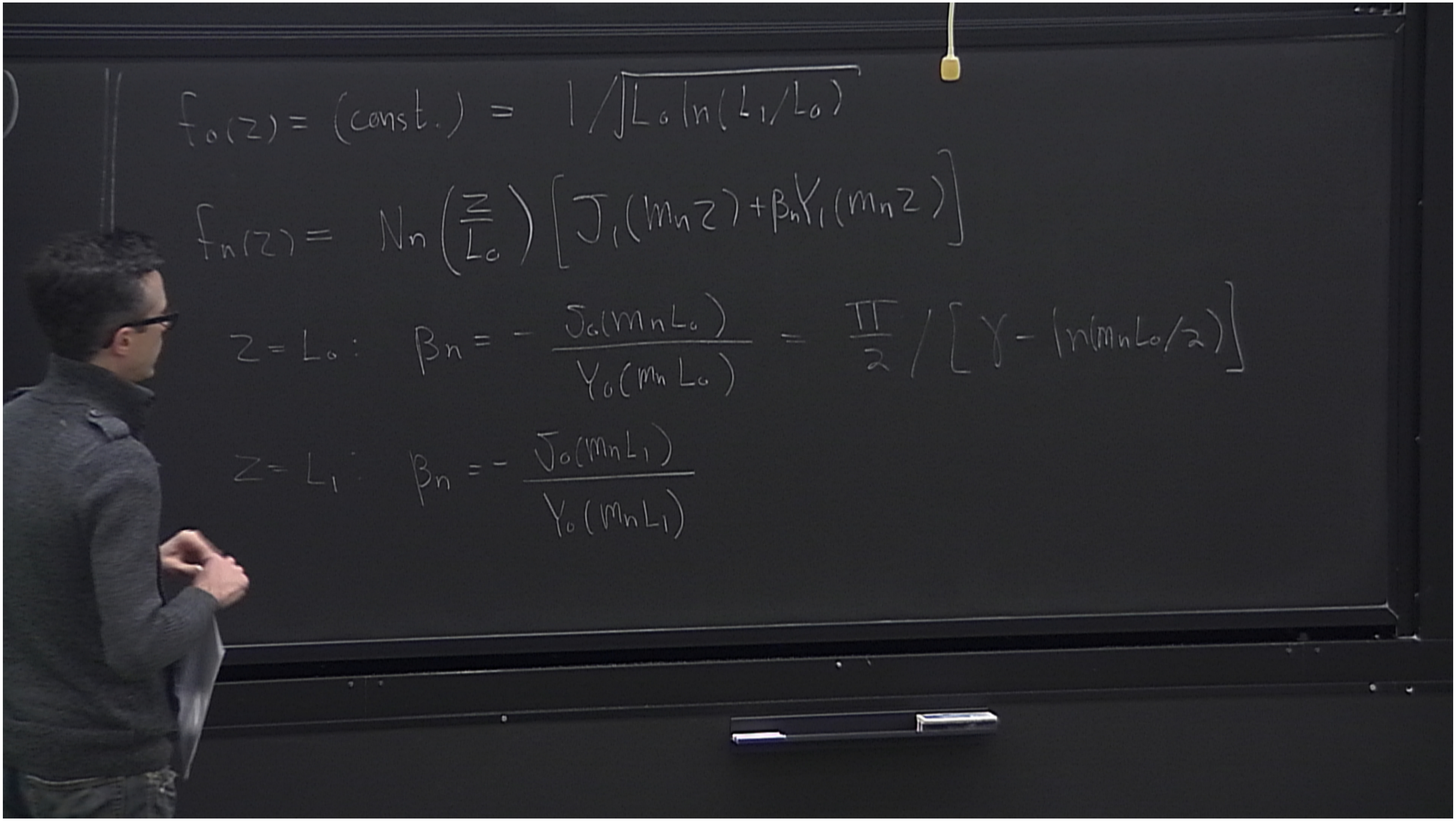
$A_5 = 0$
$A_\mu = \sum_n f_n(z)\, A^{(n)}_\mu(x)$
$\left(\frac{z}{L_0}\right) \partial_z \left[\left(\frac{L_0}{z}\right) \partial_z\right] f_n = -m_n^2 f_n$
$\int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right) f_n f_m = \delta_{mn}$

$$f_0(z) = (\text{const.}) = 1/\sqrt{L_0 \ln(L_1/L_0)}$$

$$f_n(z) = N_n \left(\frac{z}{L_0}\right)\left[J_1(m_n z) + \beta_n Y_1(m_n z)\right]$$

$$z = L_0: \quad \beta_n = -\frac{J_0(m_n L_0)}{Y_0(m_n L_0)} = \frac{\pi}{2} \Big/ \left[\gamma - \ln(m_n L_0/2)\right]$$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$z = L_1: \quad \beta_n = -\frac{J_0(m_n L_1)}{Y_0(m_n L_1)}$

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$$z = L_1: \quad \beta_n = -\frac{J_0(m_n L_1)}{Y_0(m_n L_1)} \quad \left\{ \begin{array}{l} m_n \simeq \dfrac{\pi}{L_1}\left(n - \dfrac{1}{4}\right) \quad (n \gg 1,\ L_1 \gg L_0) \\ N_n \simeq \dfrac{m_n \sqrt{L_0}}{\sqrt{n - \frac{1}{4}}} \end{array} \right.$$

RS: $ds^2 = \left(\frac{L_0}{z}\right)^2 \eta_{MN}\, dx^M dx^N = \left(\frac{L_0}{z}\right)^2 \left(\eta^{\mu\nu} dx^\mu dx^\nu - dz^2\right)$

$z = L_0 \sim k^{-1} \sim M_*^{-1}$

$z = L_1$

$L_1 = L_0 e^{\pi k r_c} \sim \mathrm{TeV}^{-1}$

$M_{Pl}^2 \simeq \frac{M_*^3}{k}$

$A_M(x,z)$, $\partial_z A_M \big|_{L_0, L_1} = 0$

$A_5 = 0$

$$A_\mu = \sum_n f_n(z)\, A^{(n)}_\mu(x)$$

$$\left(\frac{z}{L_0}\right) \partial_z \left[\left(\frac{L_0}{z}\right) \partial_z\right] f_n = -m_n^2 f_n$$

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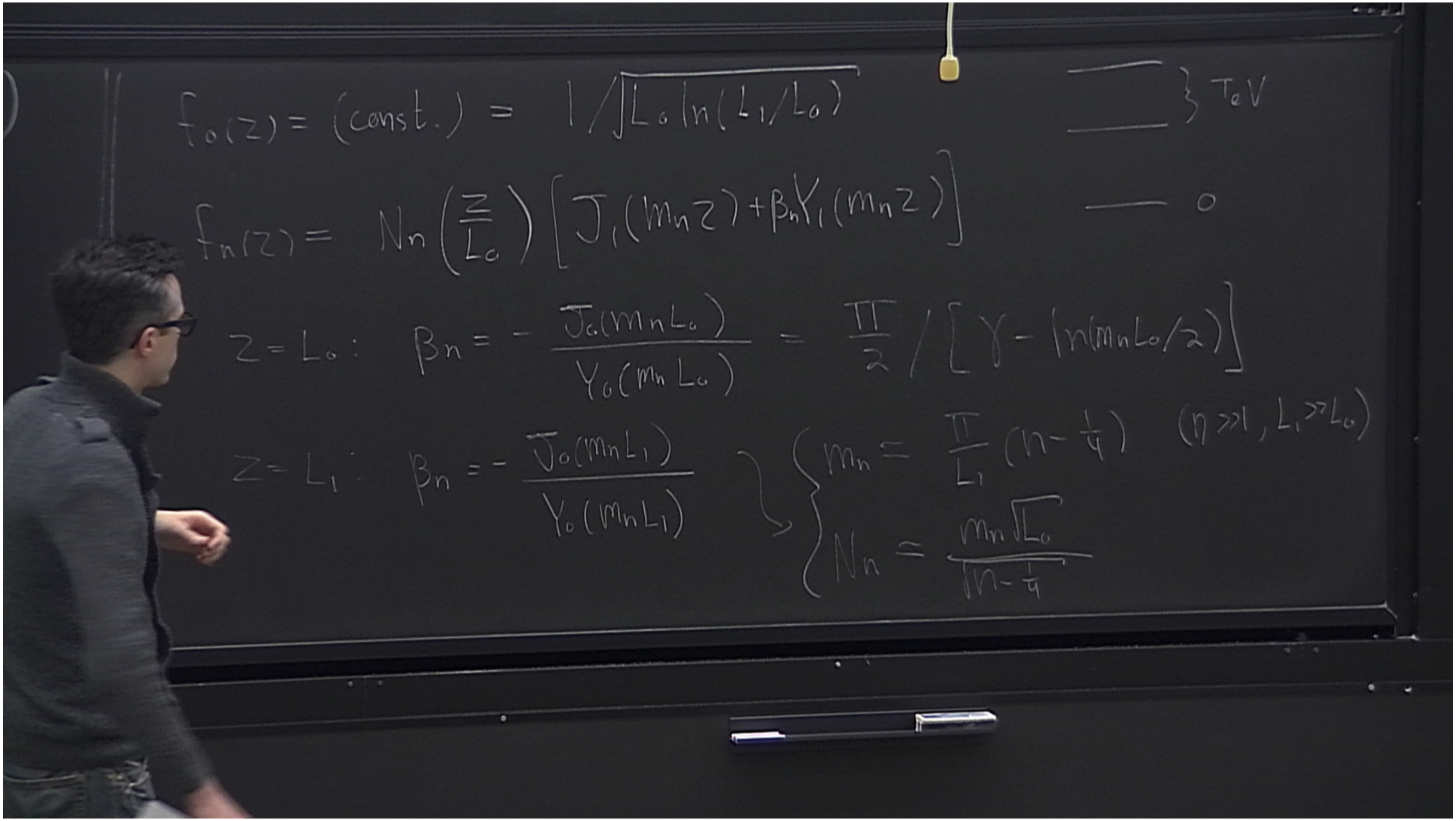
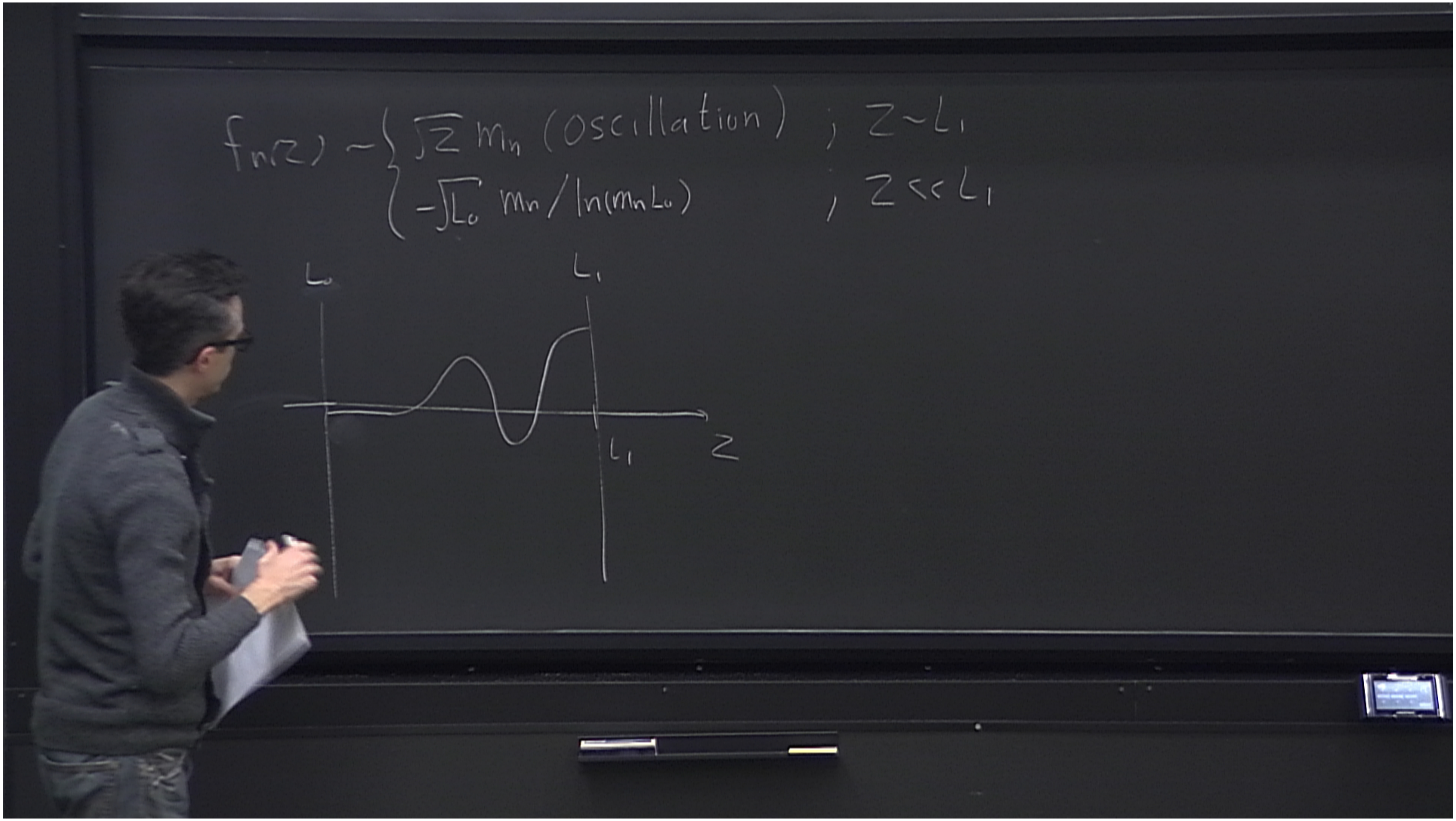
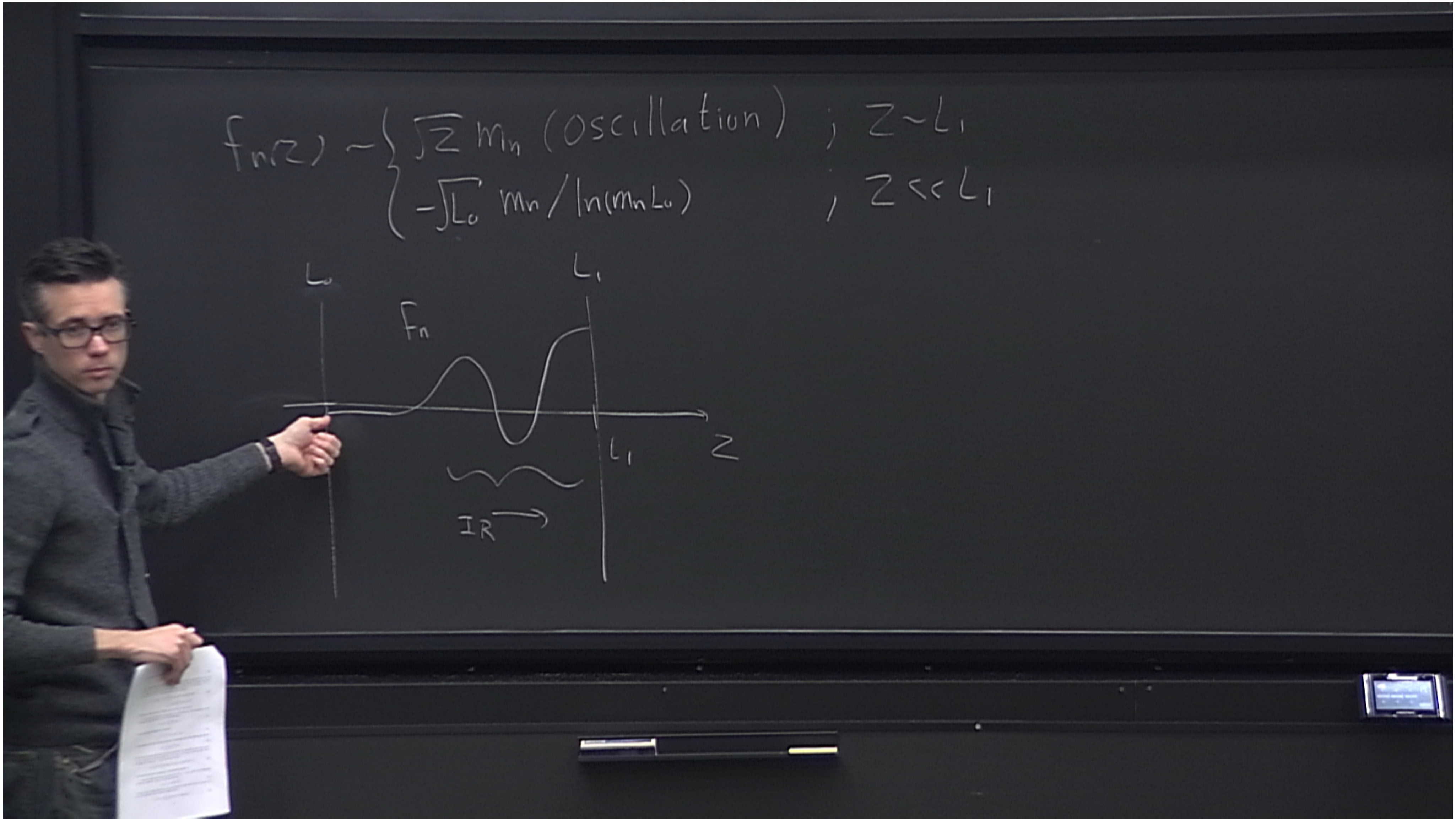

$f_0(z) = (\text{const.}) = 1/\sqrt{L_0 \ln(L_1/L_0)}$
TeV
0
$f_n(z) = N_n \left(\frac{z}{L_0}\right)\left[J_1(m_n z) + \beta_n Y_1(m_n z)\right]$
$z = L_0: \quad \beta_n = -\frac{J_0(m_n L_0)}{Y_0(m_n L_0)} = \frac{\pi}{2} / \left[\gamma - \ln(m_n L_0/2)\right]$
$z = L_1: \quad \beta_n = -\frac{J_0(m_n L_1)}{Y_0(m_n L_1)}$
$m_n \simeq \frac{\pi}{L_1}\left(n - \frac{1}{4}\right) \quad (n \gg 1, L_1 \gg L_0)$
$N_n \simeq \frac{m_n \sqrt{L_0}}{\sqrt{n - \frac{1}{4}}}$


$f_n(z) \sim \begin{cases} \sqrt{z}\, m_n \,(\text{oscillation}) & ; z \sim L_1 \\ -\sqrt{L_0}\, m_n / \ln(m_n L_0) & ; z \ll L_1 \end{cases}$
L_0
L_1
L_1
z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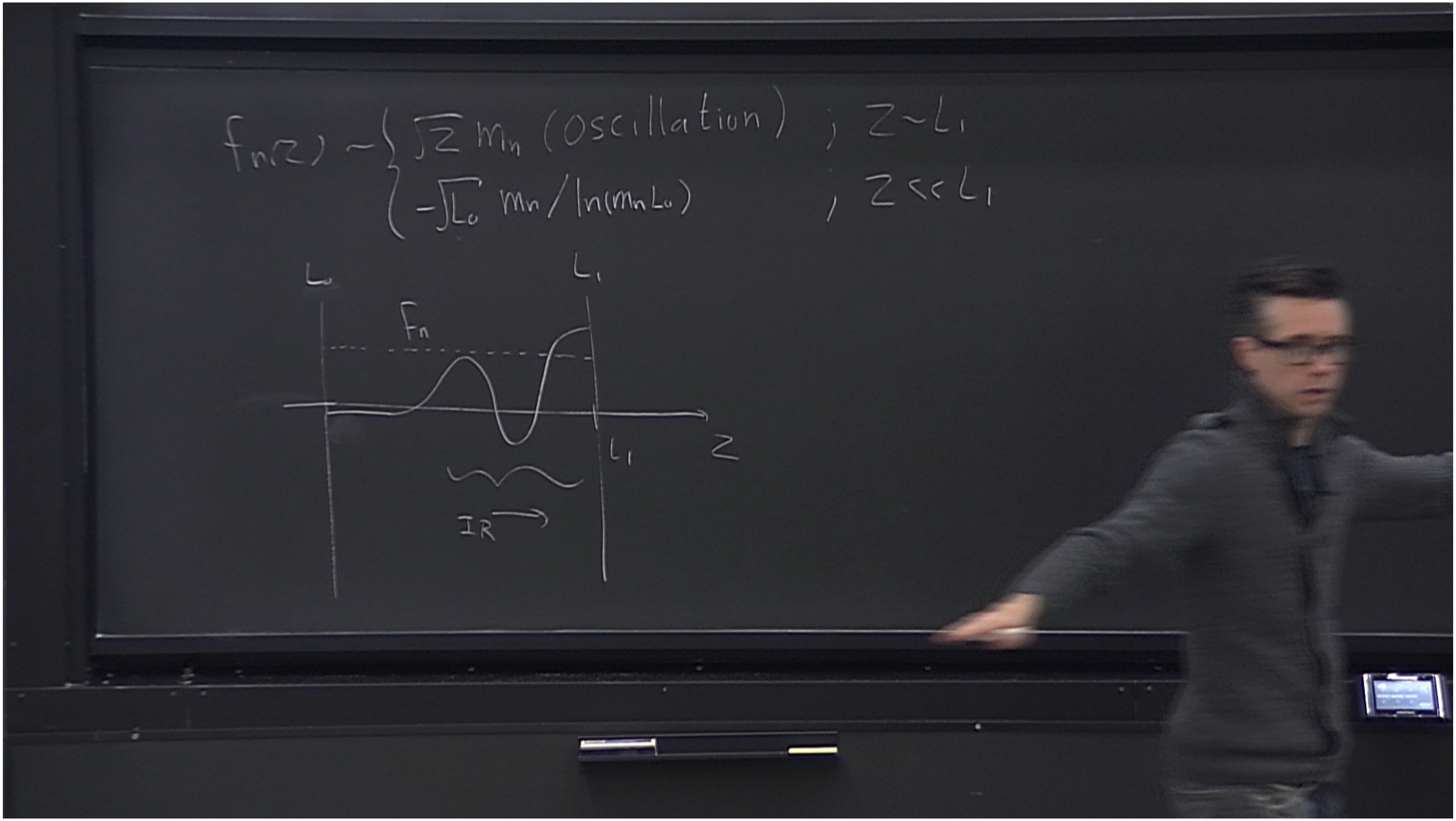
L_0
L_1
f_n
L_1
z
IR


$f_n(z) \sim \begin{cases} \sqrt{z}\, m_n\, (\text{oscillation}) & ; \; z \sim L_1 \\ -\sqrt{L_0}\, m_n / \ln(m_n L_0) & ; \; z \ll L_1 \end{cases}$
L_0
L_1
F_n
L_1
z
IR

L_1

$h_{MN} \to h_{\mu\nu}, h_{\mu a}, h_{ab} \to h^a{}_a$

decouple "radion"

$h_{\mu\nu}(x, z)$

$$G_{\mu\nu} = \left(\frac{L_0}{z}\right)^2 \left[\eta_{\mu\nu} + h_{\mu\nu}/M_*\right]$$

L_1

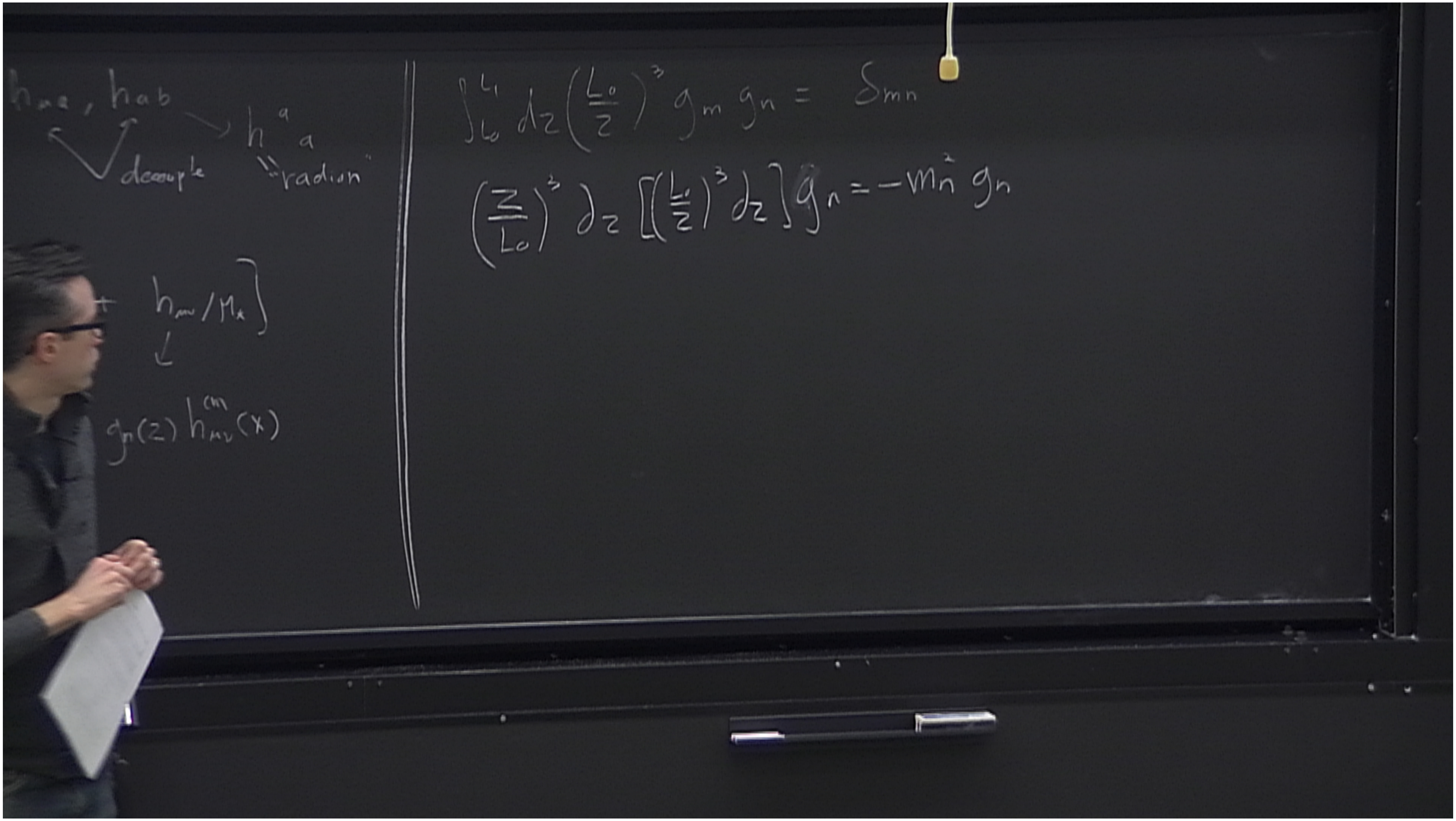
$$h_{MN} \to h_{\mu\nu},\ h_{\mu a},\ h_{ab} \to h^{a}{}_{a}$$

decouple "radion"

$$h_{\mu\nu}(x,z)$$

$$G_{\mu\nu} = \left(\frac{L_0}{z}\right)^2 \left[\eta_{\mu\nu} + h_{\mu\nu}/M_*\right]$$

$$h_{\mu\nu}(x,z) = \sum_n g_n(z)\, h^{(n)}_{\mu\nu}(x)$$


$h_{\mu a}, h_{ab} \to h^{a}{}_{a}$
decouple
"radion"
$h_{\mu\nu}/M_*$
$g_n(z)\, h^{(n)}_{\mu\nu}(x)$
$\int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right)^3 g_m g_n = \delta_{mn}$
$\left(\frac{z}{L_0}\right)^3 \partial_z \left[\left(\frac{L_0}{z}\right)^3 \partial_z\right] g_n = -m_n^2 g_n$

$h_{\mu a}, h_{ab} \rightarrow h^{a}{}_{a}$ "radion"

decouple

$[\eta_{\mu\nu} + h_{\mu\nu}/M_*]$

$= \sum_n g_n(z)\, h^{(n)}_{\mu\nu}(x)$

$$\int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right)^3 g_m g_n = \delta_{mn}$$

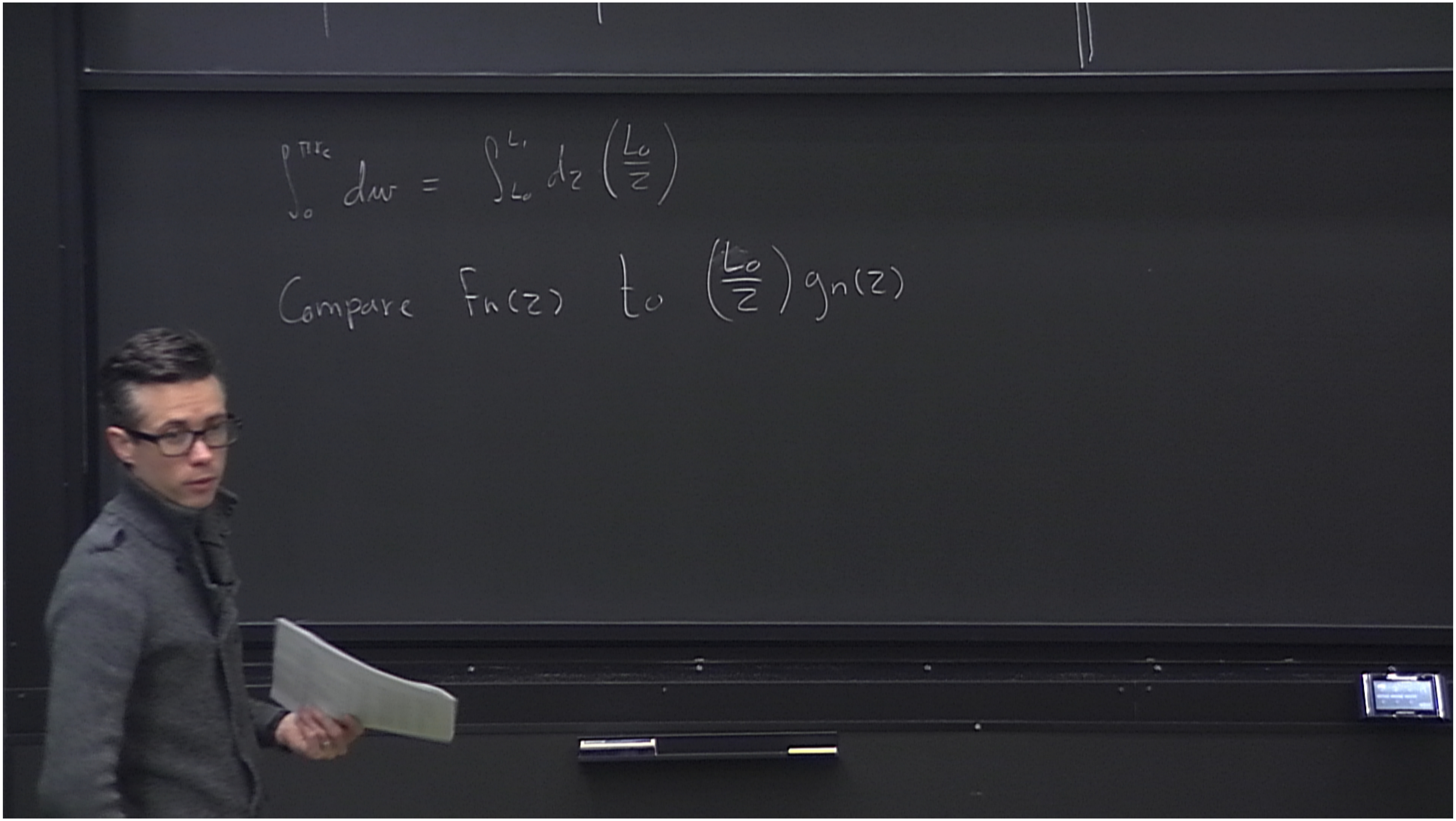
$$\left(\frac{z}{L_0}\right)^3 \partial_z \left[\left(\frac{L_0}{z}\right)^3 \partial_z\right] g_n = -m_n^2 g_n$$

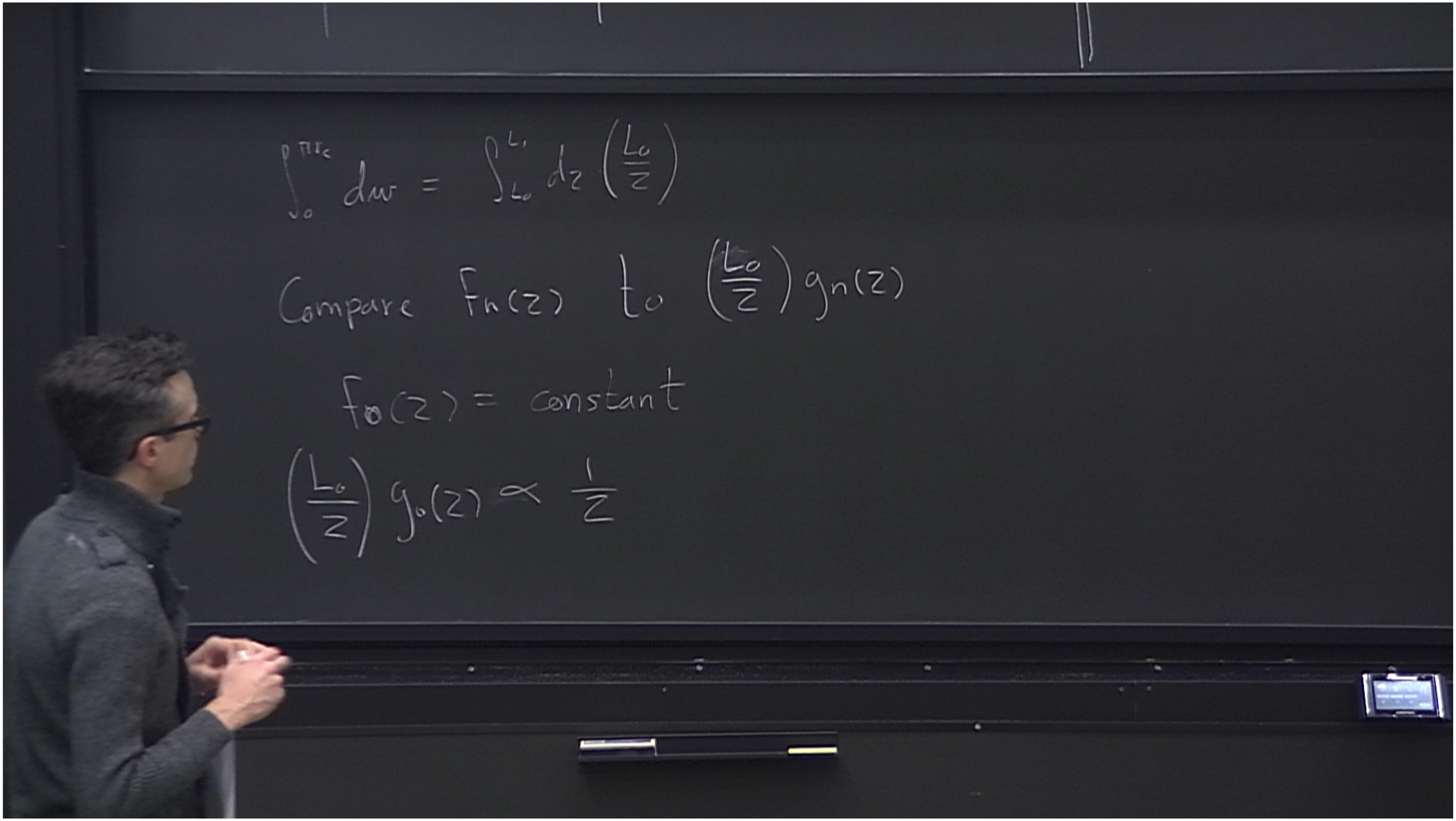
Neumann BCs.

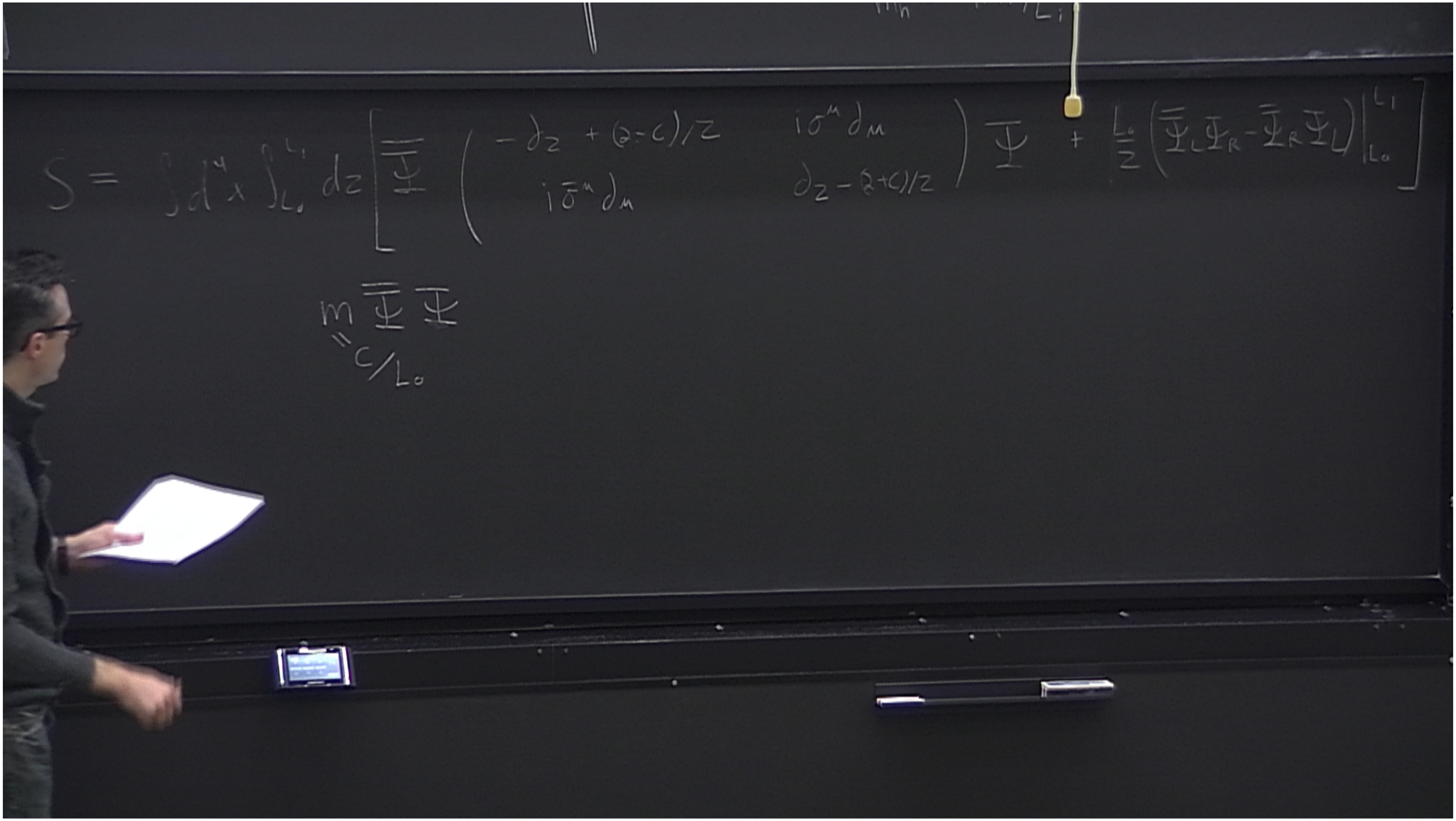
$$g_0(z) \simeq \sqrt{2/L_0}$$

$$g_n(z) = N_n \left(\frac{z}{L_0}\right)^2 \left[J_2(m_n z) + \beta_n Y_2(m_n z) \right]$$

$$m_n \sim \pi n / L_1$$


$\int_0^{\pi r_c} dw = \int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right)$
Compare $f_n(z)$ to $\left(\frac{L_0}{z}\right) g_n(z)$


$\int_0^{\pi r_c} dw = \int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right)$
Compare $f_n(z)$ to $\left(\frac{L_0}{z}\right) g_n(z)$
$f_0(z) =$ constant
$\left(\frac{L_0}{z}\right) g_0(z) \propto \frac{1}{z}$


$S = \int d^4x \int_{L_0}^{L_1} dz \left[\bar\Psi \begin{pmatrix} -\partial_z + (2-c)/z & i\sigma^\mu \partial_\mu \\ i\bar\sigma^\mu \partial_\mu & \partial_z - (2+c)/z \end{pmatrix} \Psi + \frac{L_0}{z}\left(\bar\Psi_L \Psi_R - \bar\Psi_R \Psi_L\right)\Big|_{L_0}^{L_1} \right]$
$m\,\bar\Psi\Psi$
$= c/L_0$

$$S = \int d^4x \int_{L_0}^{L_1} \left(\frac{L_0}{z}\right)^4 dz \left[\bar{\Psi} \begin{pmatrix} -\partial_z + (2-c)/z & i\sigma^\mu \partial_\mu \\ i\bar{\sigma}^\mu \partial_\mu & \partial_z - (2+c)/z \end{pmatrix} \Psi + \left(\frac{L_0}{z}\right)^4 \left(\bar{\Psi}_L \Psi_R - \bar{\Psi}_R \Psi_L\right)\Big|_{L_0}^{L_1} \right]$$

$$\underset{= c/L_0}{m}\, \bar{\Psi}\Psi$$

$$S = \int d^4x \int_{L_0}^{L_1} dz \left[\bar{\Psi} \begin{pmatrix} -\partial_z + (2-c)/z & i\sigma^\mu \partial_\mu \\ i\bar{\sigma}^\mu \partial_\mu & \partial_z - (2+c)/z \end{pmatrix} \Psi + \left(\frac{L_0}{z}\right)^4 \left(\bar{\Psi}_L \Psi_R - \bar{\Psi}_R \Psi_L\right)\Big|_{L_0}^{L_1} \right]$$

$\left(\frac{L_0}{z}\right)^4$

$m \bar{\Psi} \Psi$

$m = c/L_0$

↳ want this to vanish

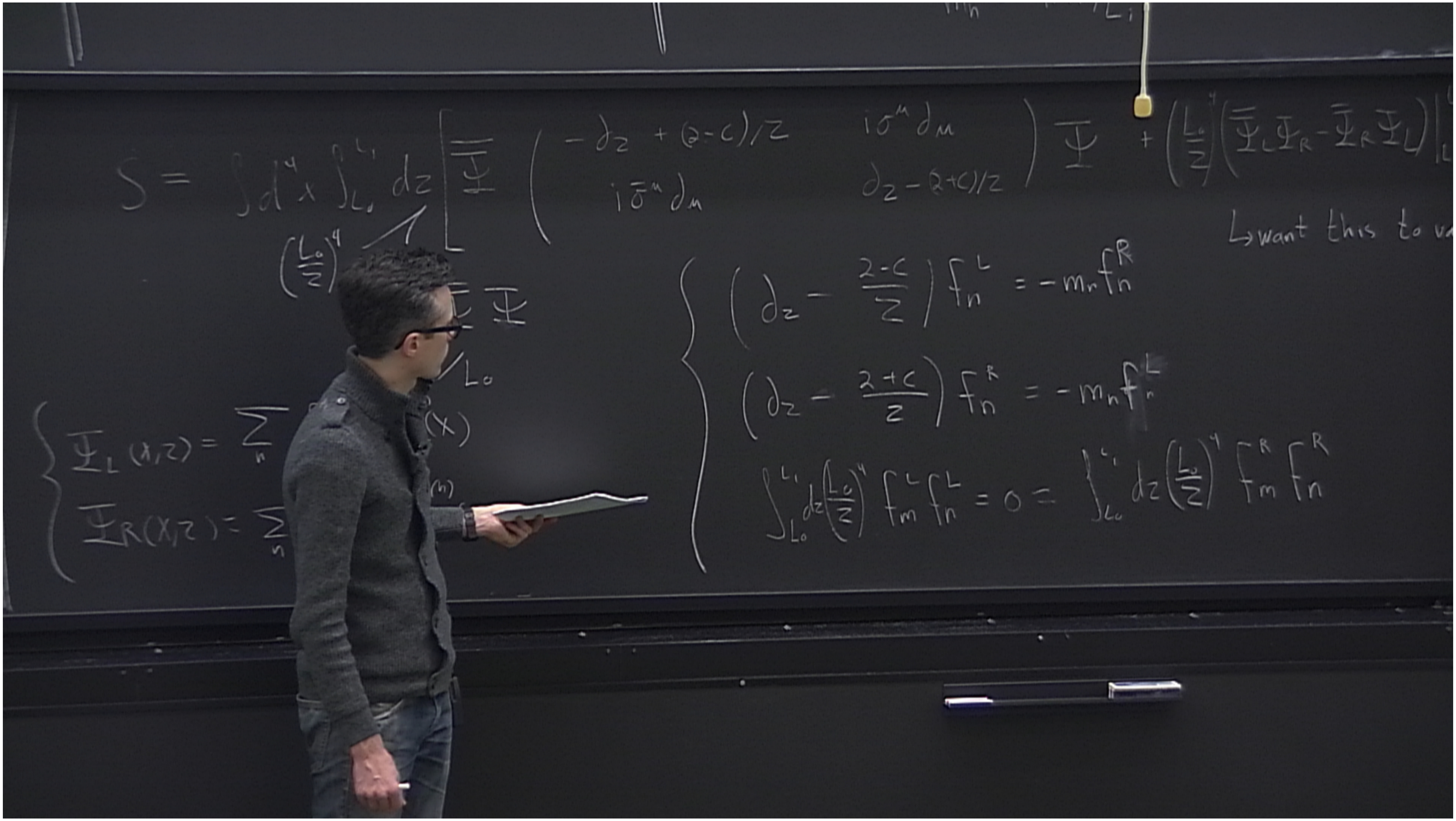
$$S = \int d^4x \int_{L_0}^{L_1} dz \left[\bar{\Psi} \begin{pmatrix} -\partial_z + (2-c)/z & i\sigma^\mu \partial_\mu \\ i\bar{\sigma}^\mu \partial_\mu & \partial_z - (2+c)/z \end{pmatrix} \Psi + \left(\frac{L_0}{z}\right)^4 \left(\bar{\Psi}_L \Psi_R - \bar{\Psi}_R \Psi_L\right)\Big|_{L} \right.$$

$$\left(\frac{L_0}{z}\right)^4$$

↳ want this to va

$$m \bar{\Psi} \Psi, \quad m = c/L_0$$

$$\begin{cases} \Psi_L(x,z) = \sum_n f_n^L(z)\, \psi_L^{(n)}(x) \\ \Psi_R(x,z) = \sum_n f_n^R(z)\, \psi_R^{(n)}(x) \end{cases}$$


want this to
$(\partial_z - \frac{2-c}{z}) f_n^L = -m_n f_n^R$
$(\partial_z - \frac{2+c}{z}) f_n^R = -m_n f_n^L$
$\int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right)^4 f_m^L f_n^L = 0 = \int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right)^4 f_m^R f_n^R$

$$S = \int d^4x \int_{L_0}^{L_1} dz \left[\bar{\Psi} \begin{pmatrix} -\partial_z + (2-c)/z & i\sigma^\mu \partial_\mu \\ i\bar{\sigma}^\mu \partial_\mu & \partial_z - (2+c)/z \end{pmatrix} \Psi \right. + \left(\frac{L_0}{z}\right)^4 \left(\bar{\Psi}_L \Psi_R - \bar{\Psi}_R \Psi_L\right)\Big|_{L}$$

$\left(\frac{L_0}{z}\right)^4$

↳ want this to va

$m \bar{\Psi}\Psi$

$= c/L_0$

$$\begin{cases} \Psi_L(x,z) = \sum_n f_n^L(z)\, \psi_L^{(n)}(x) \\ \Psi_R(x,z) = \sum_n f_n^R(z)\, \psi_R^{(n)}(x) \end{cases}$$

$$\begin{cases} \left(\partial_z - \frac{2-c}{z}\right) f_n^L = -m_n f_n^R \\ \left(\partial_z - \frac{2+c}{z}\right) f_n^R = -m_n f_n^L \\ \int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right)^4 f_m^L f_n^L = 0 = \int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right)^4 f_m^R f_n^R \end{cases}$$

$$\left(\frac{z}{L_0}\right)^4 \partial_z \left[\left(\frac{L_0}{z}\right)^4 \partial_z\right] f_n^L = -\left(m_n^2 - \frac{c^2+c-6}{z^2}\right) f_n^L$$

$$\left(\quad \cdots \quad \right) f_n^R = -\left(m_n^2 - \frac{c^2-c-6}{z^2}\right) f_n^R$$

$$\left(\frac{z}{L_0}\right)^4 \partial_z \left[\left(\frac{L_0}{z}\right)^4 \partial_z\right] f_n^L = -\left(m_n^2 - \frac{c^2+c-6}{z^2}\right) f_n^L$$

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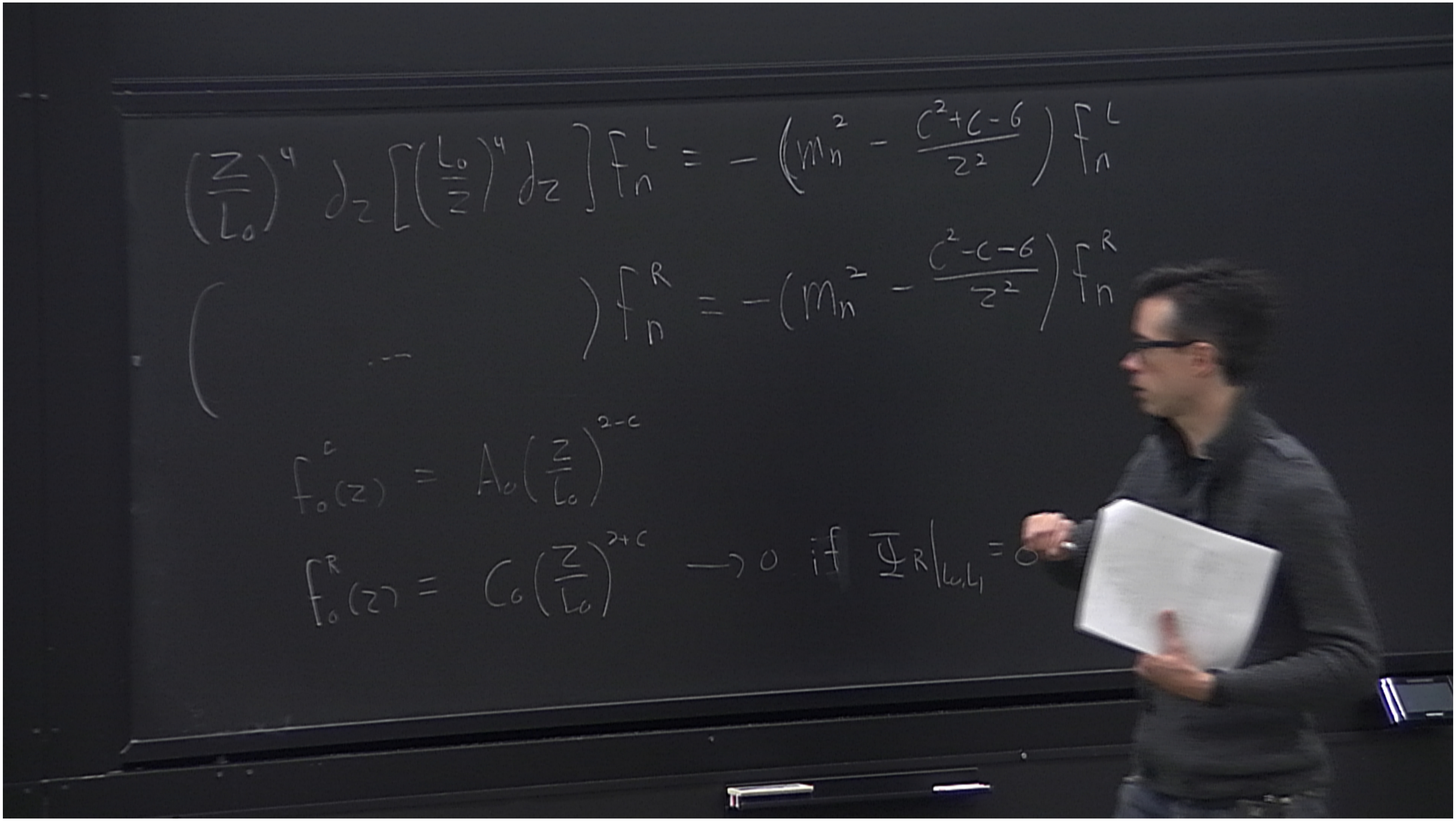
$$f_0^L(z) = A_0 \left(\frac{z}{L_0}\right)^{2-c}$$

$$f_0^R(z) = C_0 \left(\frac{z}{L_0}\right)^{2+c}$$


$\left(\frac{z}{L_0}\right)^4 \partial_z\left[\left(\frac{L_0}{z}\right)^4 \partial_z\right] f_n^L = -\left(m_n^2 - \frac{c^2+c-6}{z^2}\right) f_n^L$
$\left(\ldots \right) f_n^R = -\left(m_n^2 - \frac{c^2-c-6}{z^2}\right) f_n^R$
$f_0^L(z) = A_0\left(\frac{z}{L_0}\right)^{2-c}$
$f_0^R(z) = C_0\left(\frac{z}{L_0}\right)^{2+c} \longrightarrow 0$ if $\Psi_R\big|_{L_0,L_1} = 0$

$$\left(\frac{z}{L_0}\right)^4 \partial_z \left[\left(\frac{L_0}{z}\right)^4 \partial_z\right] f_n^L = -\left(m_n^2 - \frac{c^2+c-6}{z^2}\right) f_n^L$$

$$\Big(\quad \cdots \quad \Big) f_n^R = -\left(m_n^2 - \frac{c^2-c-6}{z^2}\right) f_n^R$$

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$$f_0^L(z) = A_0 \left(\frac{z}{L_0}\right)^{2-c}$$

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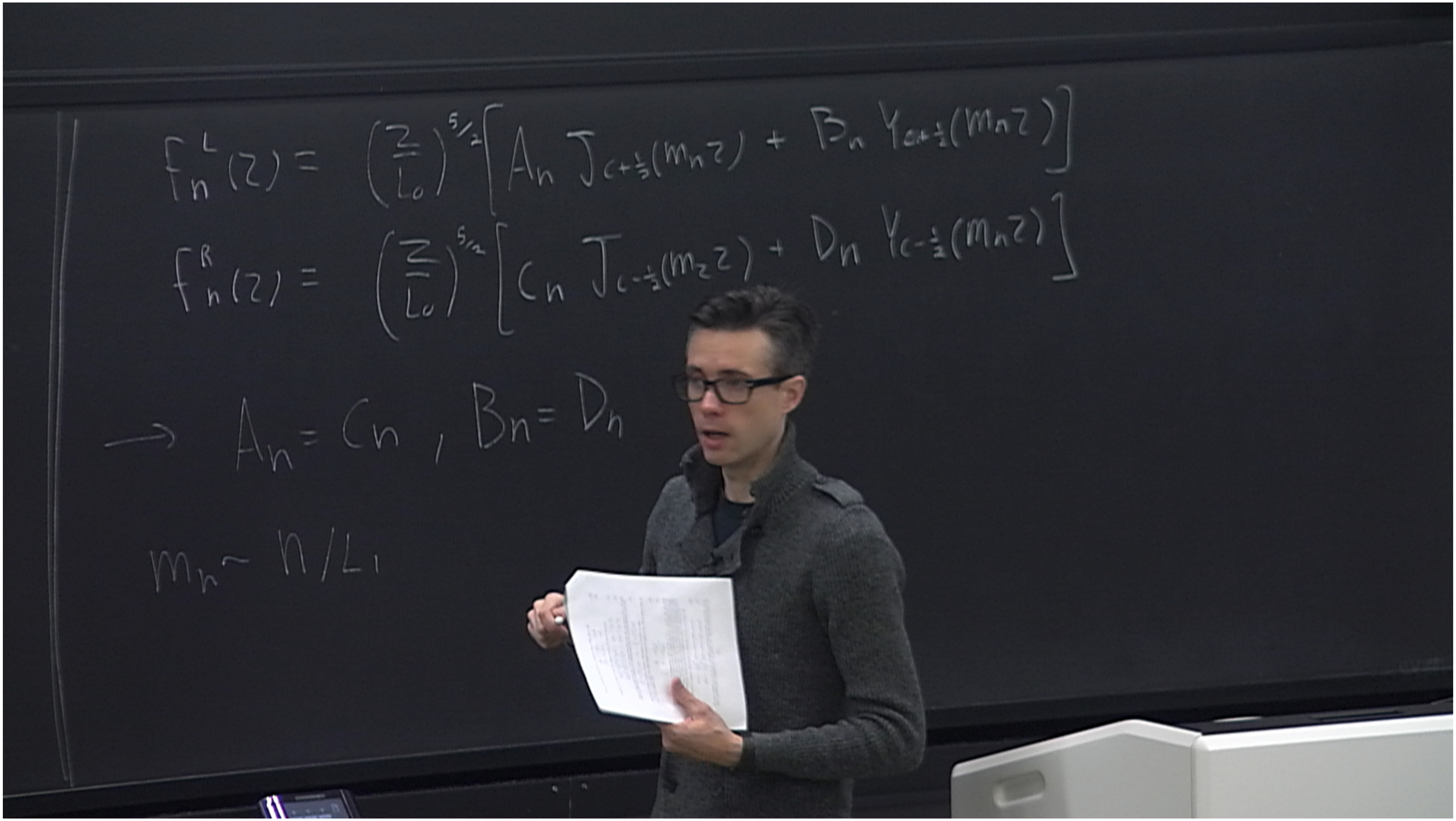
$$f_n^L(z) = \left(\frac{z}{L_0}\right)^{5/2}\left[A_n J_{c+\frac{1}{2}}(m_n z) + B_n Y_{c+\frac{1}{2}}(m_n z)\right]$$

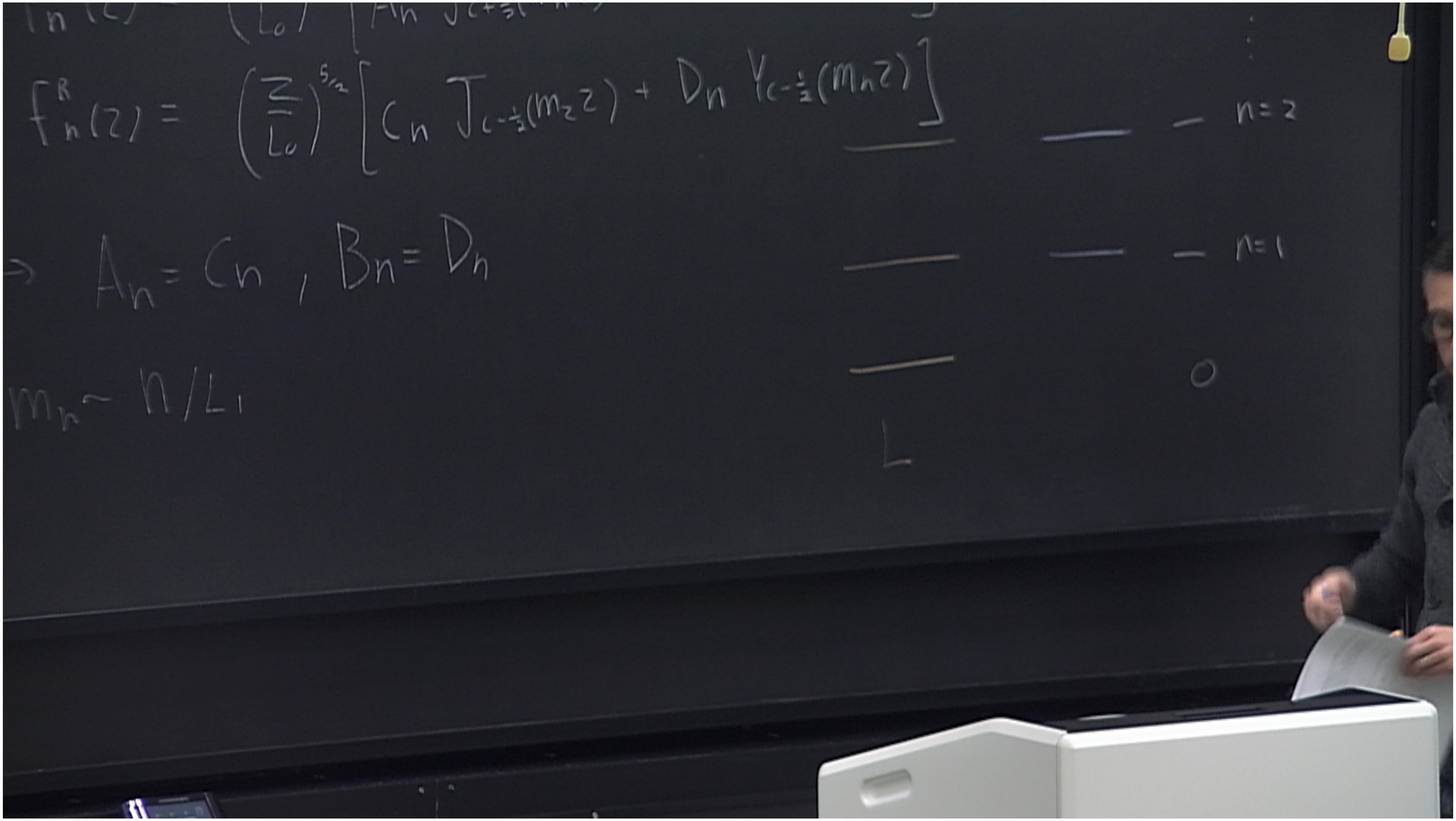
$$f_n^R(z) = \left(\frac{z}{L_0}\right)^{5/2}\left[C_n J_{c-\frac{1}{2}}(m_n z) + D_n Y_{c-\frac{1}{2}}(m_n z)\right]$$

$$f_n^L(z) = \left(\frac{z}{L_0}\right)^{5/2}\left[A_n J_{c+\frac{1}{2}}(m_n z) + B_n Y_{c+\frac{1}{2}}(m_n z)\right]$$

$$f_n^R(z) = \left(\frac{z}{L_0}\right)^{5/2}\left[C_n J_{c-\frac{1}{2}}(m_n z) + D_n Y_{c-\frac{1}{2}}(m_n z)\right]$$

$$A_n = C_n \,, \quad B_n = D_n$$


$f_n^L(z) = \left(\frac{z}{L_0}\right)^{5/2}\left[A_n J_{c+\frac{1}{2}}(m_n z) + B_n Y_{c+\frac{1}{2}}(m_n z)\right]$
$f_n^R(z) = \left(\frac{z}{L_0}\right)^{5/2}\left[C_n J_{c-\frac{1}{2}}(m_2 z) + D_n Y_{c-\frac{1}{2}}(m_n z)\right]$
$\rightarrow \quad A_n = C_n \, , \; B_n = D_n$
$m_n \sim n/L_1$


$f^R_n(z) = \left(\frac{z}{L_0}\right)^{5/2}\left[C_n J_{c-\frac{1}{2}}(m_n z) + D_n Y_{c-\frac{1}{2}}(m_n z)\right]$
$\Rightarrow A_n = C_n , B_n = D_n$
$m_n \sim n/L_1$
$n=2$
$n=1$
0
L

$$f_n(z) = \left(\frac{z}{L_0}\right)\left[A_n\, J_{c+\frac{1}{2}}(\ldots \right]$$

$$f^R_n(z) = \left(\frac{z}{L_0}\right)^{5/2}\left[C_n\, J_{c-\frac{1}{2}}(m_n z) + D_n\, Y_{c-\frac{1}{2}}(m_n z)\right]$$

$$\Rightarrow \quad A_n = C_n \;, \quad B_n = D_n$$

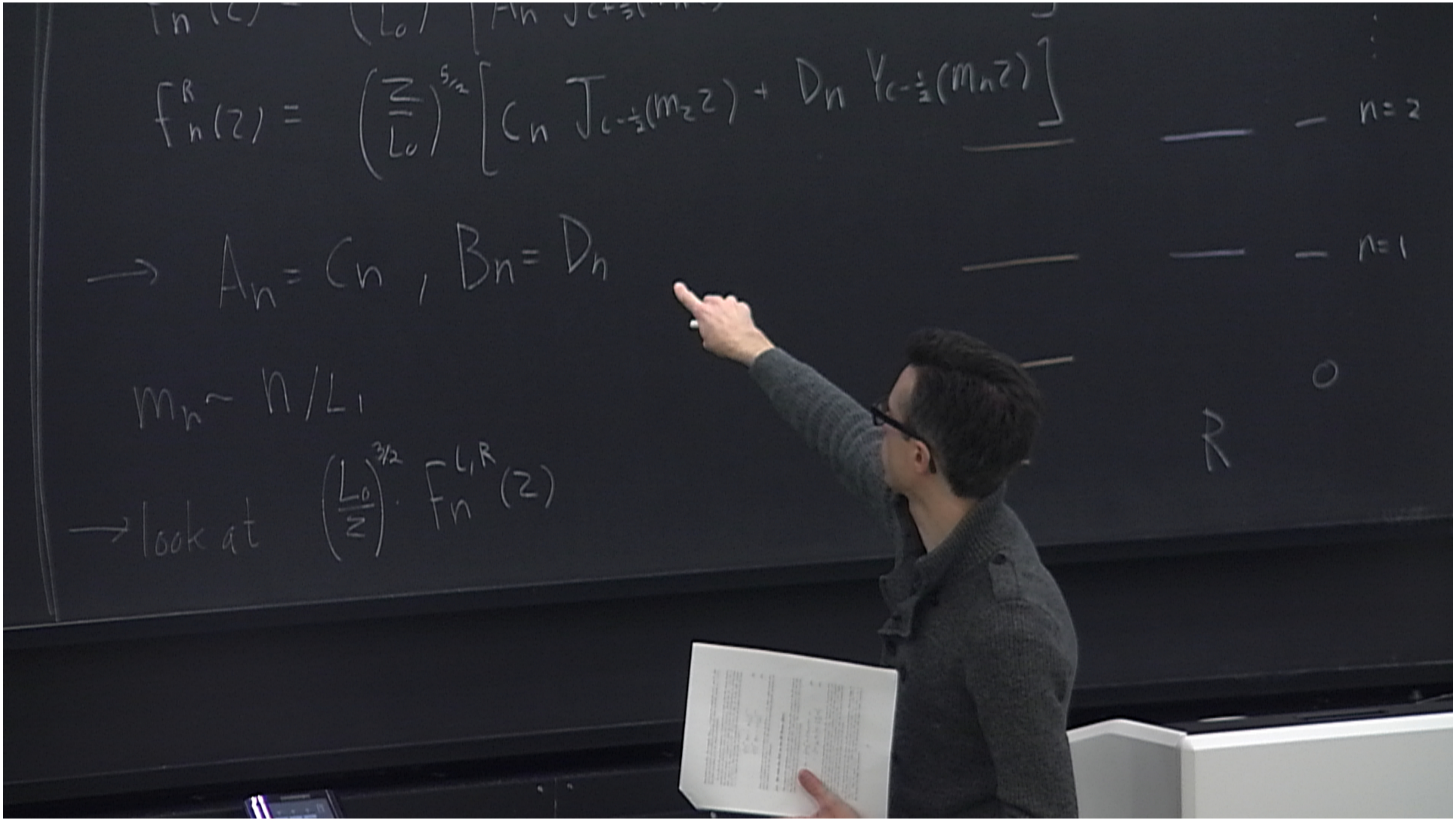
$$m_n \sim n/L_1$$

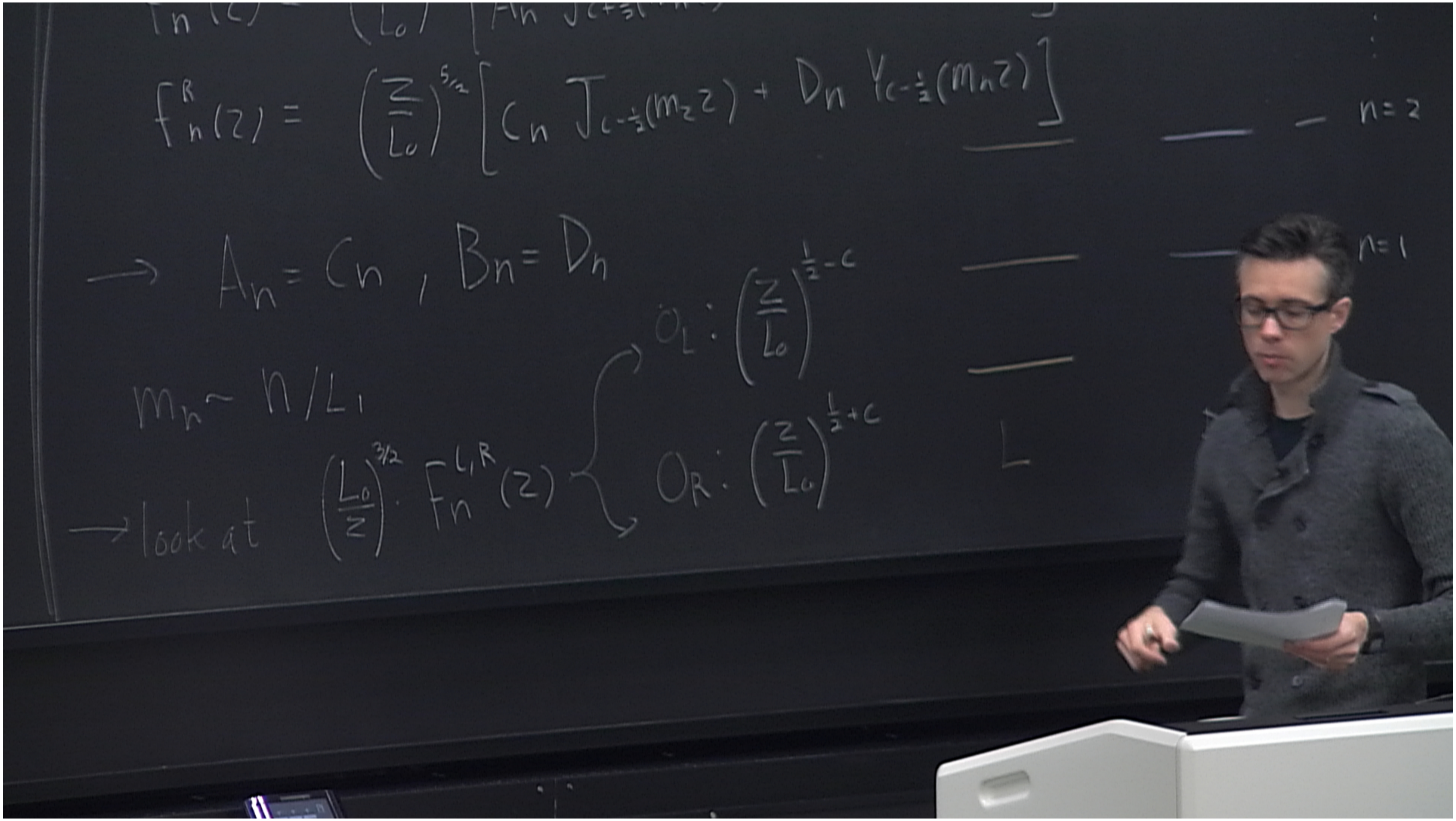
$n=2$

$n=1$

0

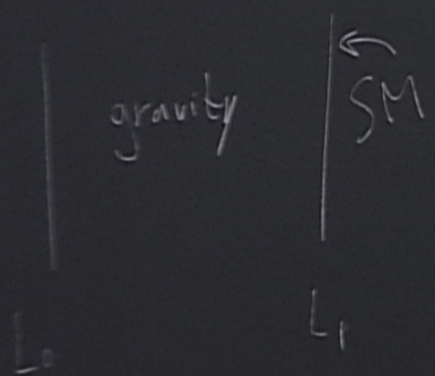
L R


$f^R_n(z) = \left(\frac{z}{L_0}\right)^{5/2}\left[C_n J_{c-\frac{1}{2}}(m_n z) + D_n Y_{c-\frac{1}{2}}(m_n z)\right]$
$n=2$
$\rightarrow A_n = C_n , B_n = D_n$
$n=1$
0
$m_n \sim n/L_1$
R
$\rightarrow$ look at $\left(\frac{L_0}{z}\right)^{3/2} f_n^{L,R}(z)$



$f_n^R(z) = \left(\frac{z}{L_0}\right)^{5/2}\left[C_n J_{c-\frac{1}{2}}(m_n z) + D_n Y_{c-\frac{1}{2}}(m_n z)\right]$
n = 2
$\rightarrow A_n = C_n , B_n = D_n$
n = 1
$m_n \sim n/L_1$
$O_L : \left(\frac{z}{L_0}\right)^{\frac{1}{2}-c}$
$\rightarrow$ look at $\left(\frac{L_0}{z}\right)^{3/2} \cdot f_n^{L,R}(z)$
$O_R : \left(\frac{z}{L_0}\right)^{\frac{1}{2}+c}$

Minimal RS (RS1)



$$S_{RS1} \supset \int d^4x \, \frac{1}{M_{Pl}} T^{\mu\nu}_{SM} \left[h^{(0)}_{\mu\nu} + \overbrace{\left(\frac{L_1}{L_0}\right)}^{e^{\pi k r_c}} \sum_{n=1}^{\infty} h^{(n)}_{\mu\nu} \right]$$

Minimal RS (RS1)

$$\frac{1}{M_{Pl}} \longrightarrow \frac{1}{M_{Pl}\left(\frac{L_1}{L_0}\right)} \sim \frac{1}{TeV}$$

gravity

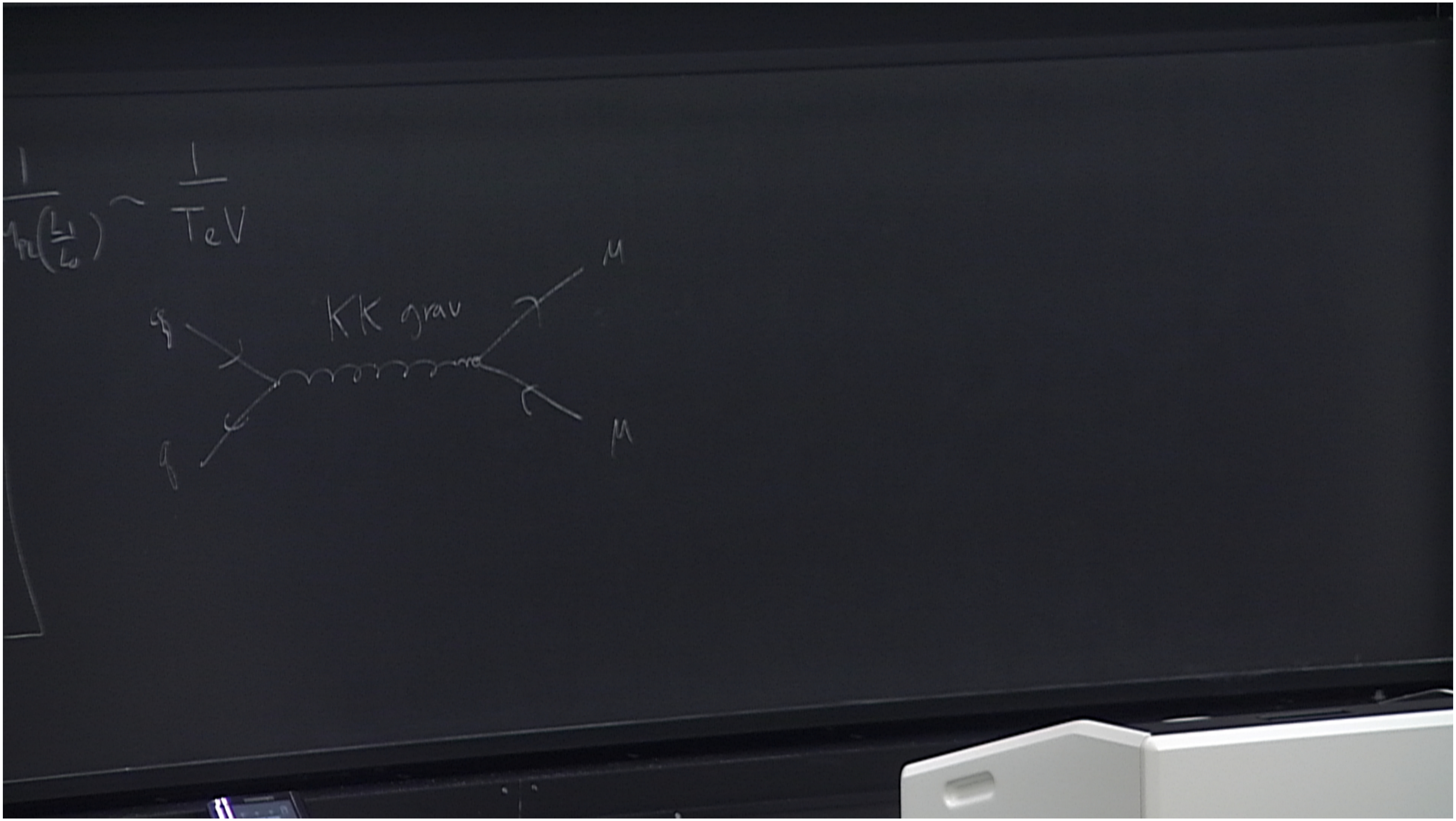
SM

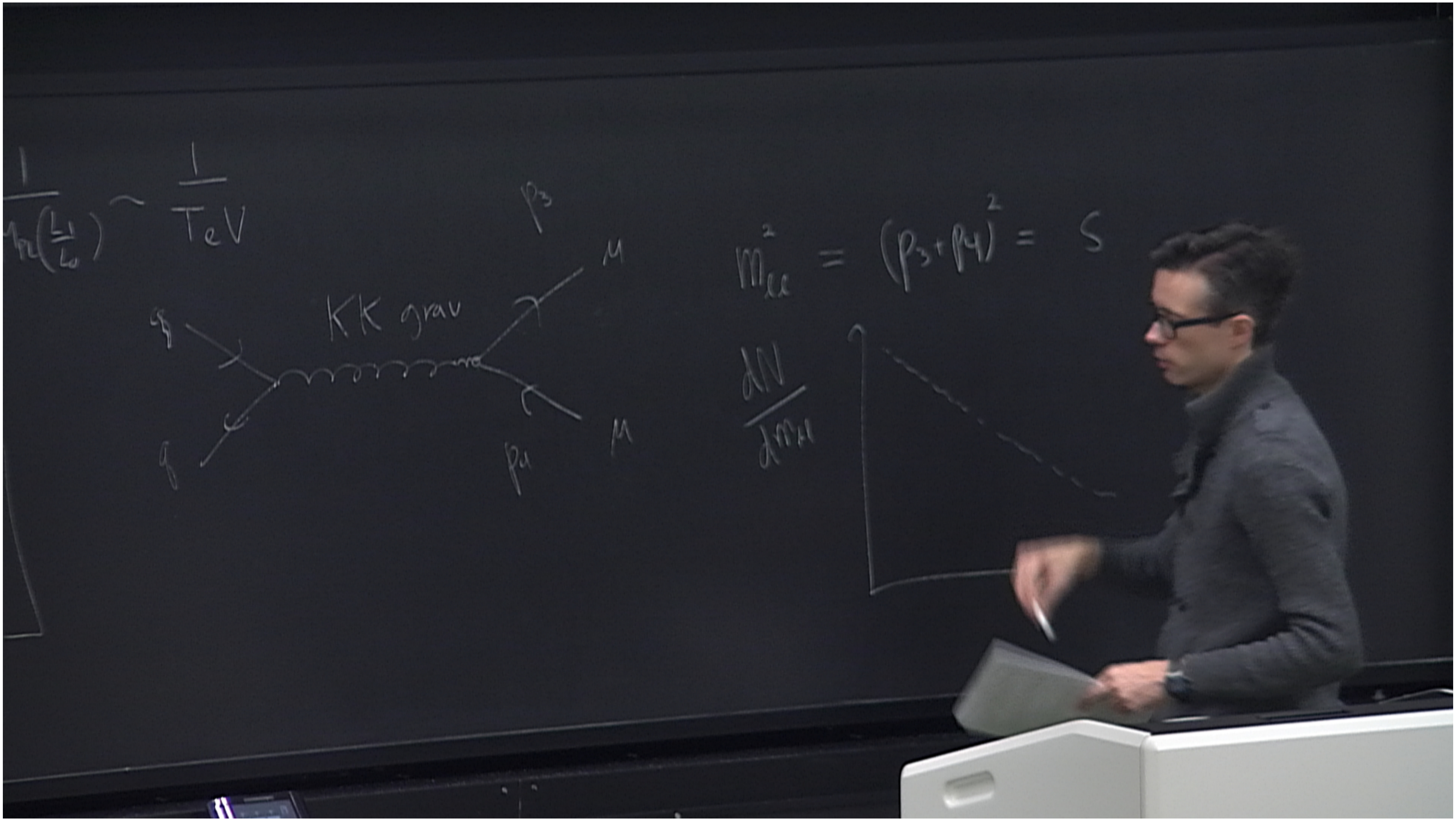
L_0 L_1

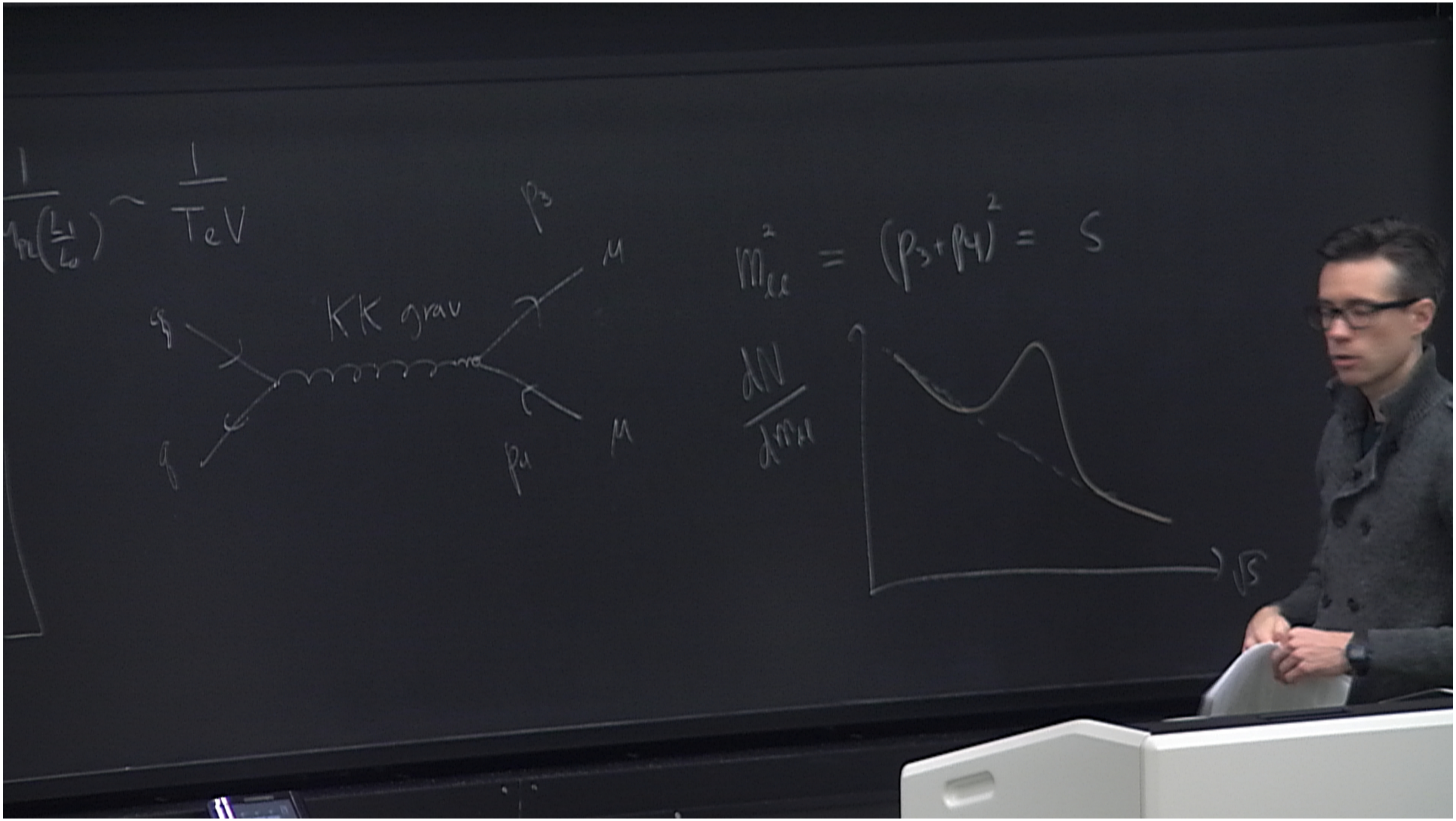
$e^{\pi k r_c}$

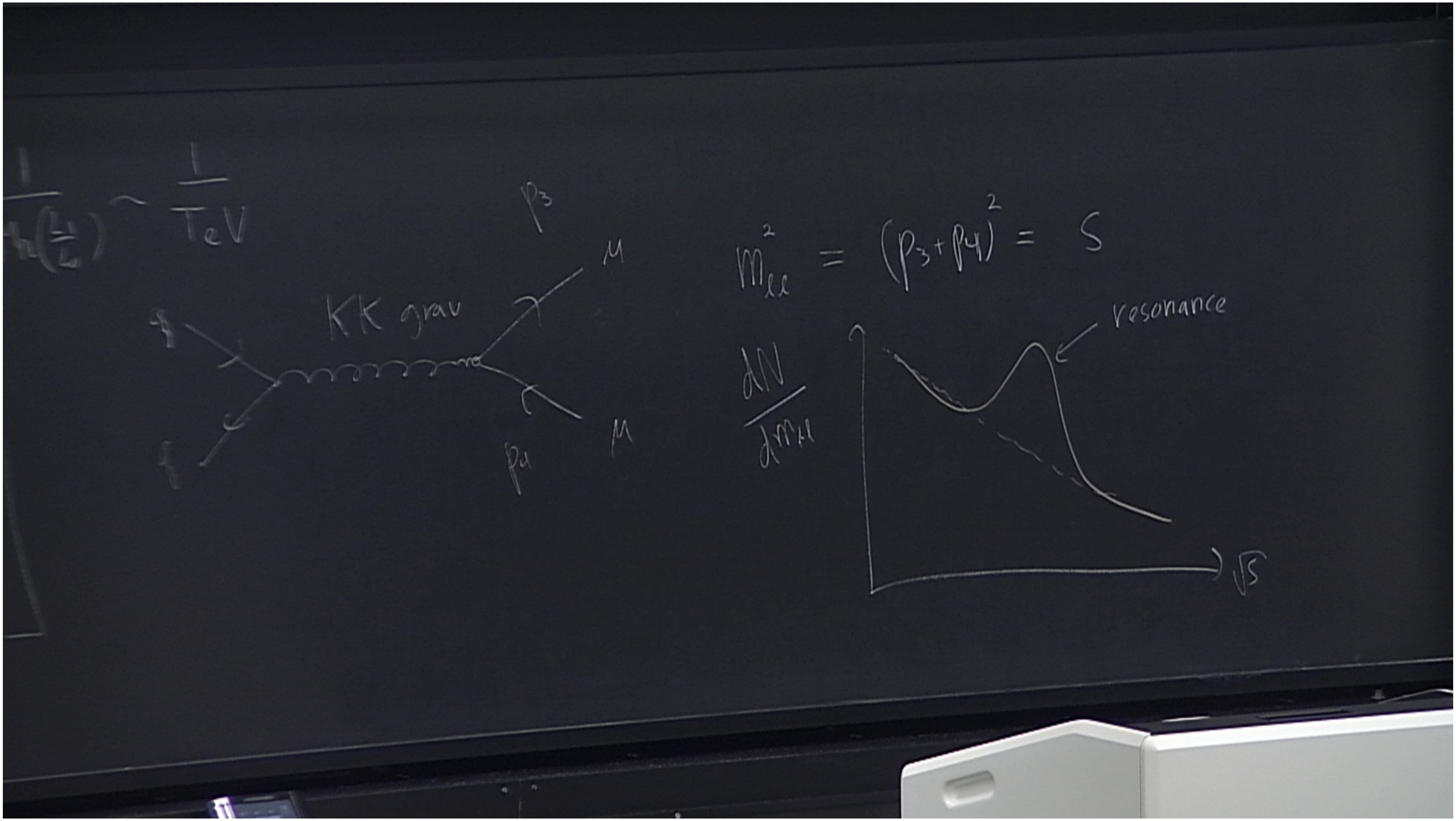
"

$$S_{RS1} \supset \int d^4x \, \frac{1}{M_{Pl}} T^{\mu\nu}_{SM} \left[h^{(0)}_{\mu\nu} + \left(\frac{L_1}{L_0}\right) \sum_{n=1}^{\infty} h^{(n)}_{\mu\nu} \right]$$


~ 1/TeV
q
KK grav
μ
q
μ


KK grav
$m_{ll}^2 = (p_3+p_4)^2 = s$
$\frac{dN}{dm_{ll}}$
$\frac{1}{TeV}$


KK grav
TeV
$m_{\ell\ell}^2 = (p_3+p_4)^2 = s$
$\frac{dN}{dm_{\ell\ell}}$
$\sqrt{s}$


1/TeV
KK grav
p3
μ
p4
μ
m_ll^2 = (p3+p4)^2 = s
resonance
dN/dm_ll
√s

Minimal RS (RS1)

gravity

SM

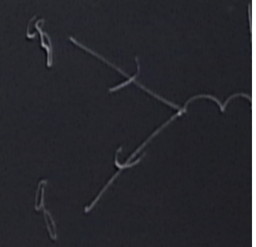
L_0 $\quad$ L_1

$$\left(\frac{k}{M_{Pl}}\right)$$

$$\frac{1}{M_{Pl}} \longrightarrow \frac{1}{M_{Pl}\left(\frac{L_1}{L_0}\right)} \sim \frac{1}{TeV}$$

$$e^{\pi k r_c}$$

''



$$S_{RS1} \supset \int d^4x \, \frac{1}{M_{Pl}} T^{\mu\nu}_{SM} \left[h^{(0)}_{\mu\nu} + \left(\frac{L_1}{L_0}\right) \sum_{n=1}^{\infty} h^{(n)}_{\mu\nu} \right]$$

nimal RS (RS1)

gravity

SM

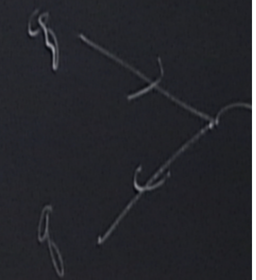
L_1

$$\left(\frac{k}{M_{Pl}}\right)$$

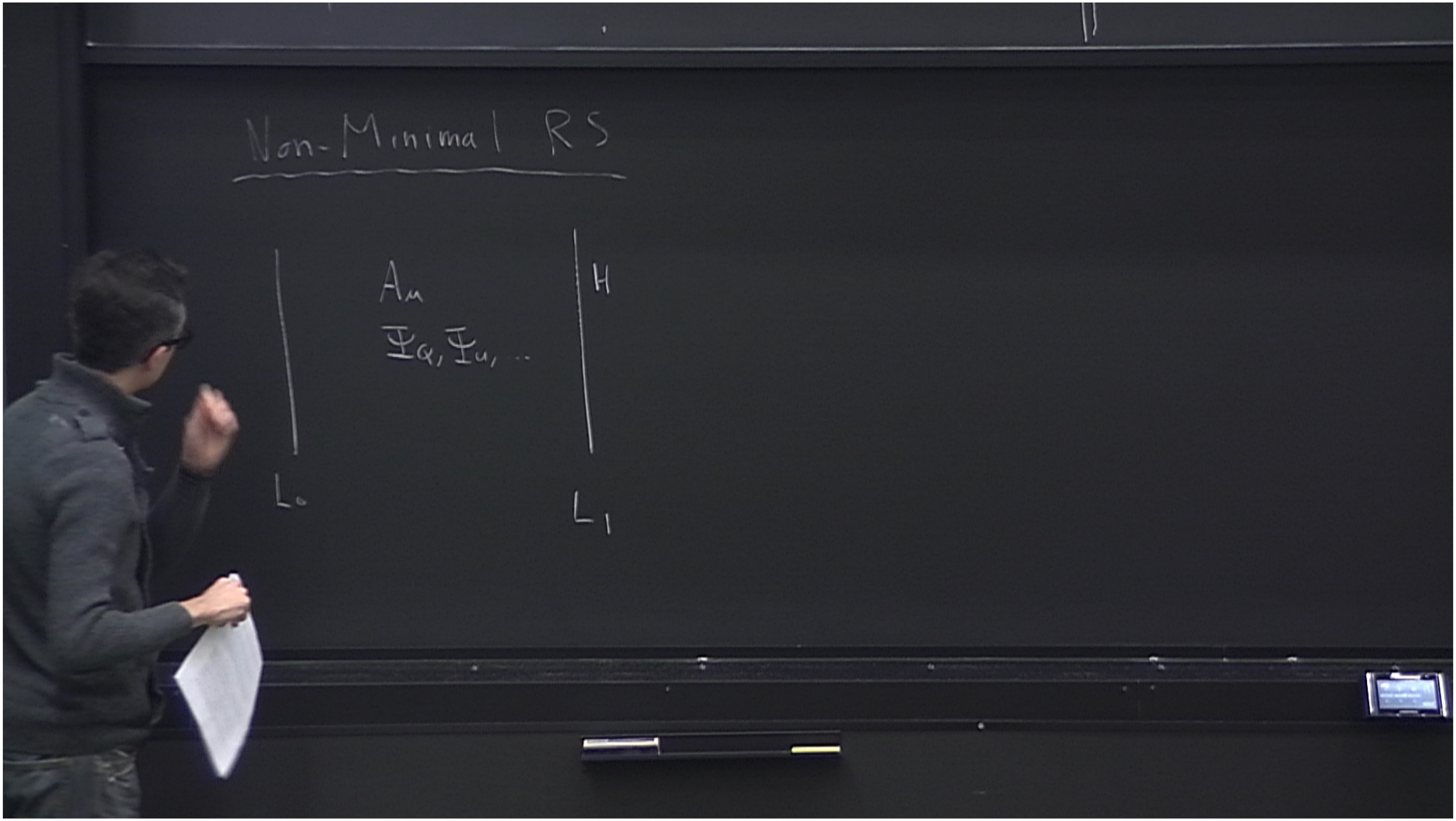
$$\frac{1}{M_{Pl}} \longrightarrow \frac{1}{M_{Pl}\left(\frac{L_1}{L_0}\right)} \sim \frac{1}{TeV}$$

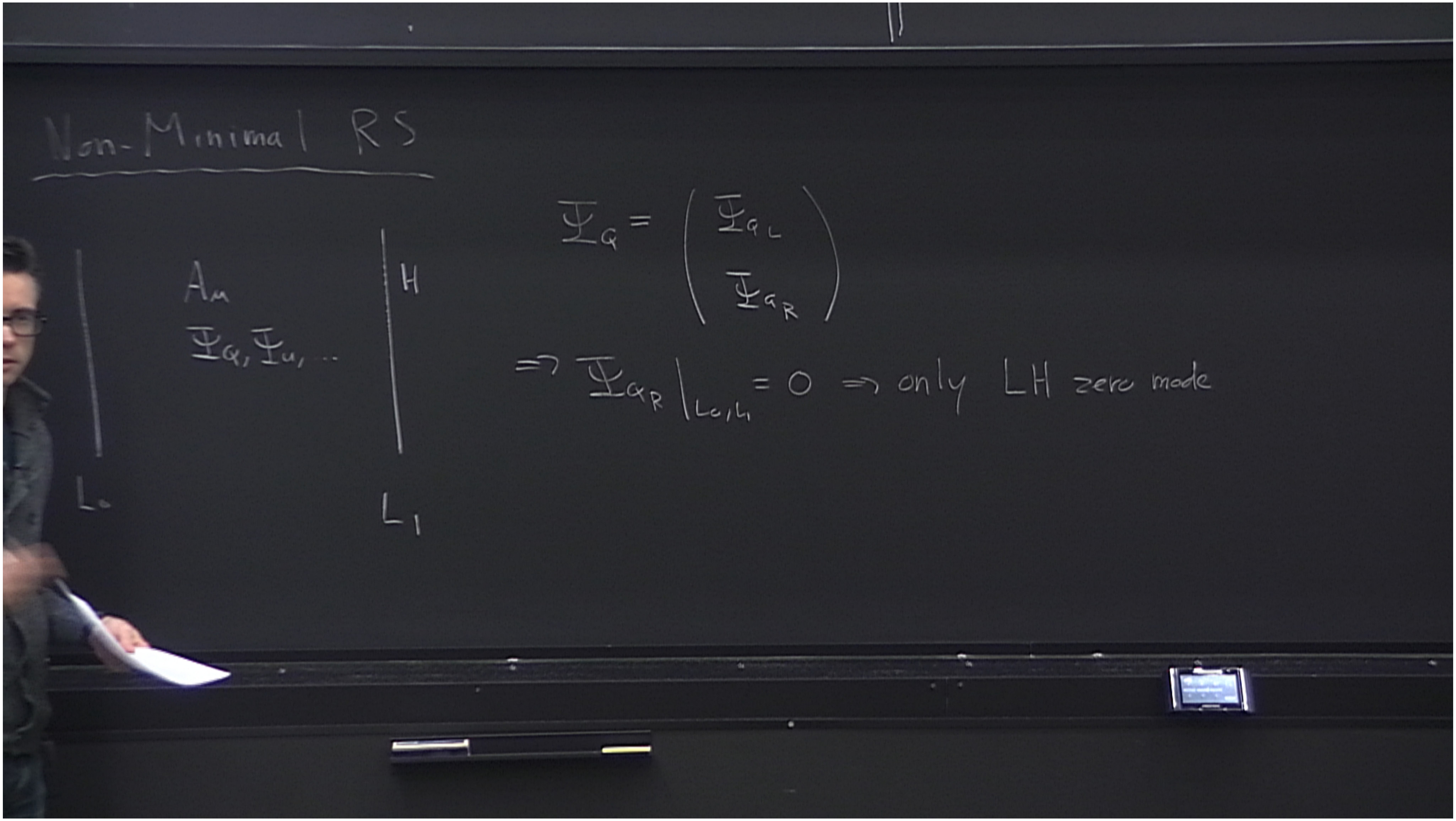
$$e^{\pi k r_c}$$

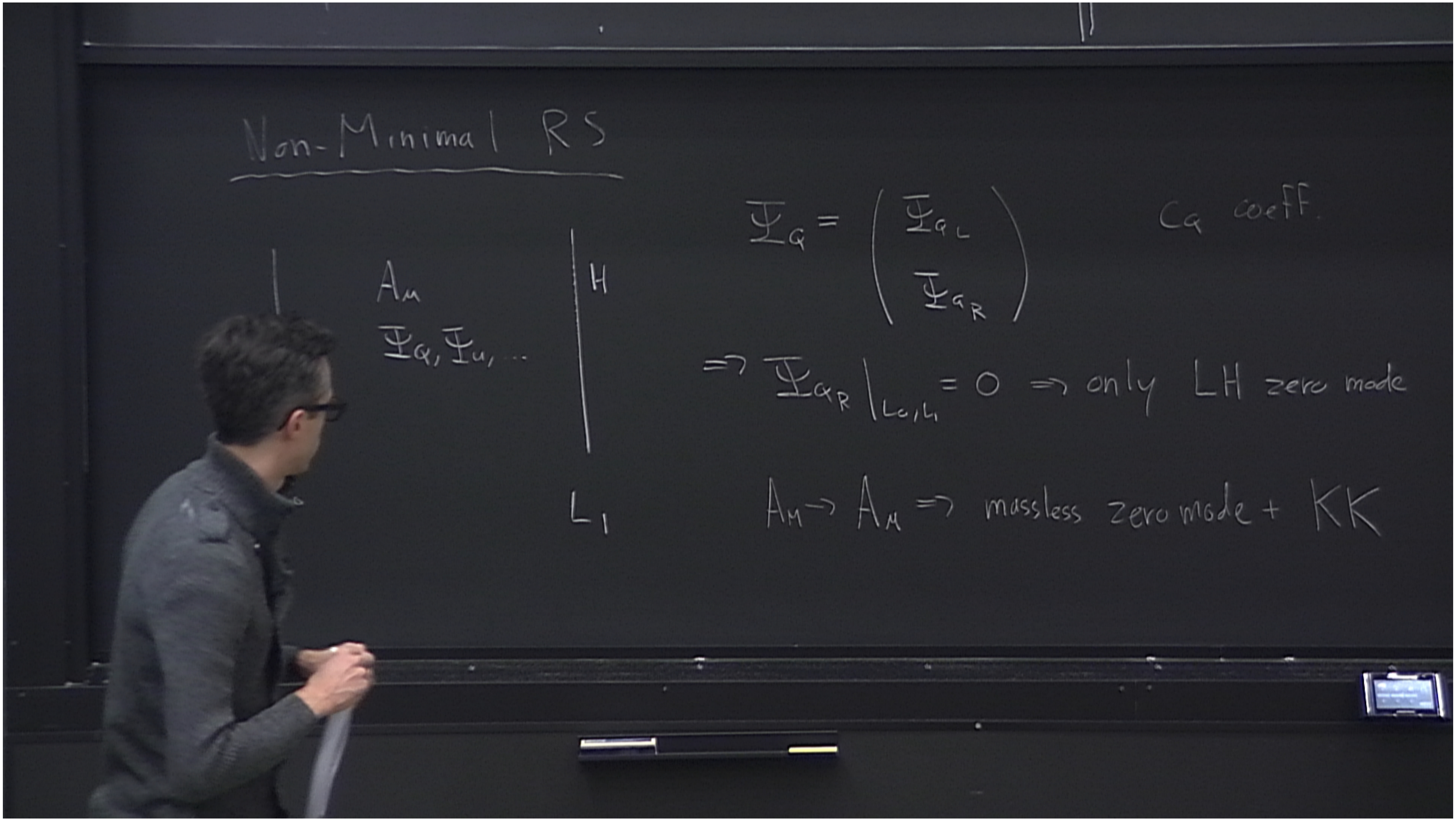
"

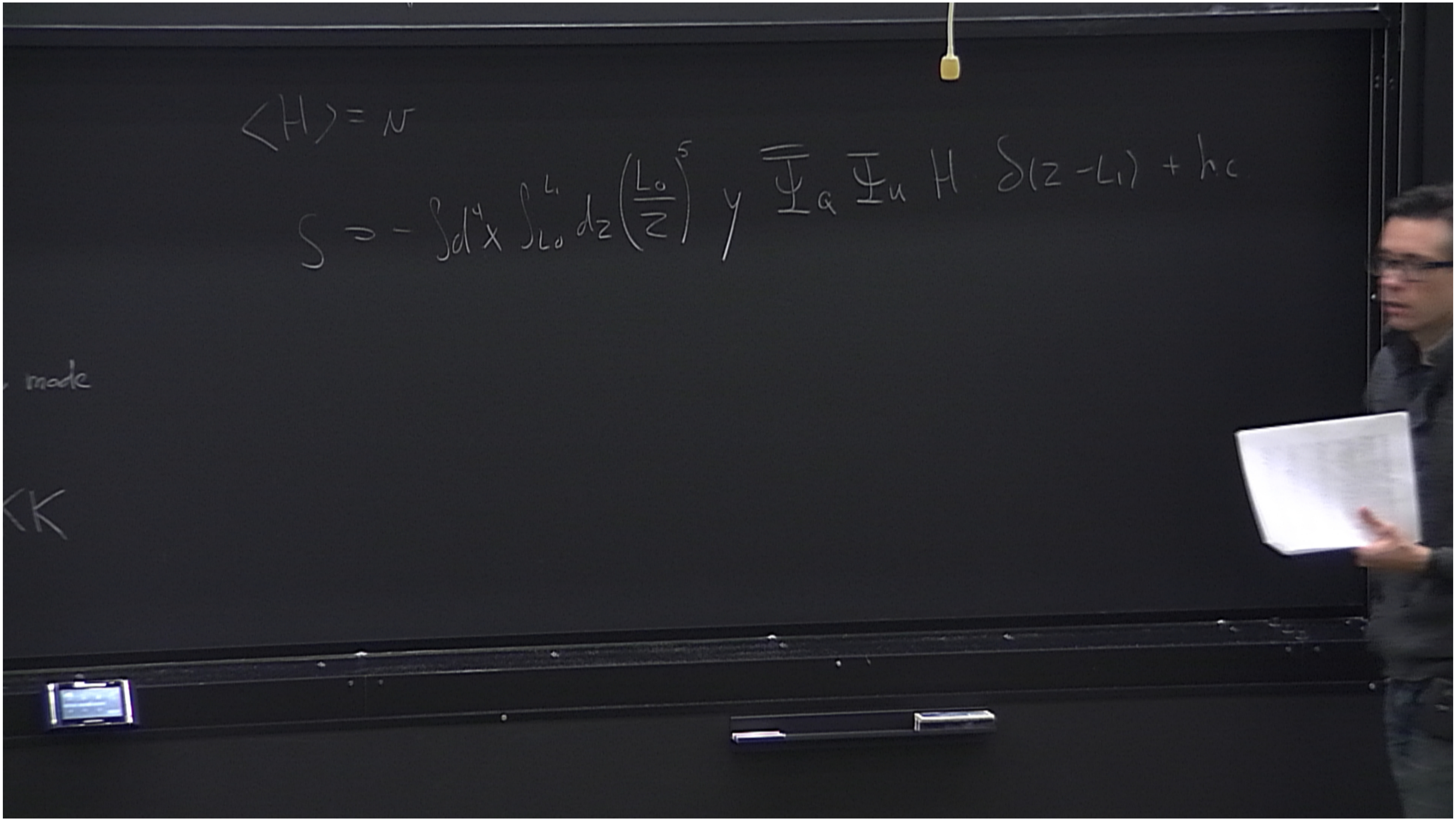


$$S_{RS1} \supset \int d^4x \, \frac{1}{M_{Pl}} \, T^{\mu\nu}_{SM} \left[h^{(0)}_{\mu\nu} + \left(\frac{L_1}{L_0}\right) \sum_{n=1}^{\infty} h^{(n)}_{\mu\nu} \right]$$


Non-Minimal RS
A_μ
$\Phi_Q, \Phi_u, \dots$
H
L_0
L_1


Non-Minimal RS
A_M
$\Psi_Q, \Psi_u, \ldots$
H
L_0
L_1
$\Psi_Q = \begin{pmatrix} \Psi_{Q_L} \\ \Psi_{Q_R} \end{pmatrix}$
$\Rightarrow \Psi_{Q_R}\big|_{L_0, L_1} = 0 \Rightarrow$ only LH zero mode


Non-Minimal RS
A_M
$\Psi_Q, \Psi_u, \ldots$
H
L_1
$\Psi_Q = \begin{pmatrix} \Psi_{Q_L} \\ \Psi_{Q_R} \end{pmatrix}$
c_Q coeff.
$\Rightarrow \Psi_{Q_R}\big|_{L_0, L_1} = 0 \Rightarrow$ only LH zero mode
$A_M \to A_M \Rightarrow$ massless zero mode + KK


$\langle H \rangle = v$
$S = -\int d^4x \int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right)^5 y\, \bar{\Psi}_Q \Psi_u H\, \delta(z - L_1) + h.c$
mode
KK

$$\langle H \rangle = v$$

$$S \supset -\int d^4x \int_{L_0}^{L_1} dz \underbrace{\left(\frac{L_0}{z}\right)^5}_{=\sqrt{G}} y\, \bar{\Psi}_Q \Psi_u H\, \delta(z - L_1) + h.c.$$

$$\supset -\int d^4x\, A_0^Q C_0^u\, y \left(\frac{L_1}{L_0}\right)^{\frac{1}{2}-c_Q} \left(\frac{L_1}{L_0}\right)^{\frac{1}{2}-c_u} \bar{Q}_L u_R H$$

made

KK

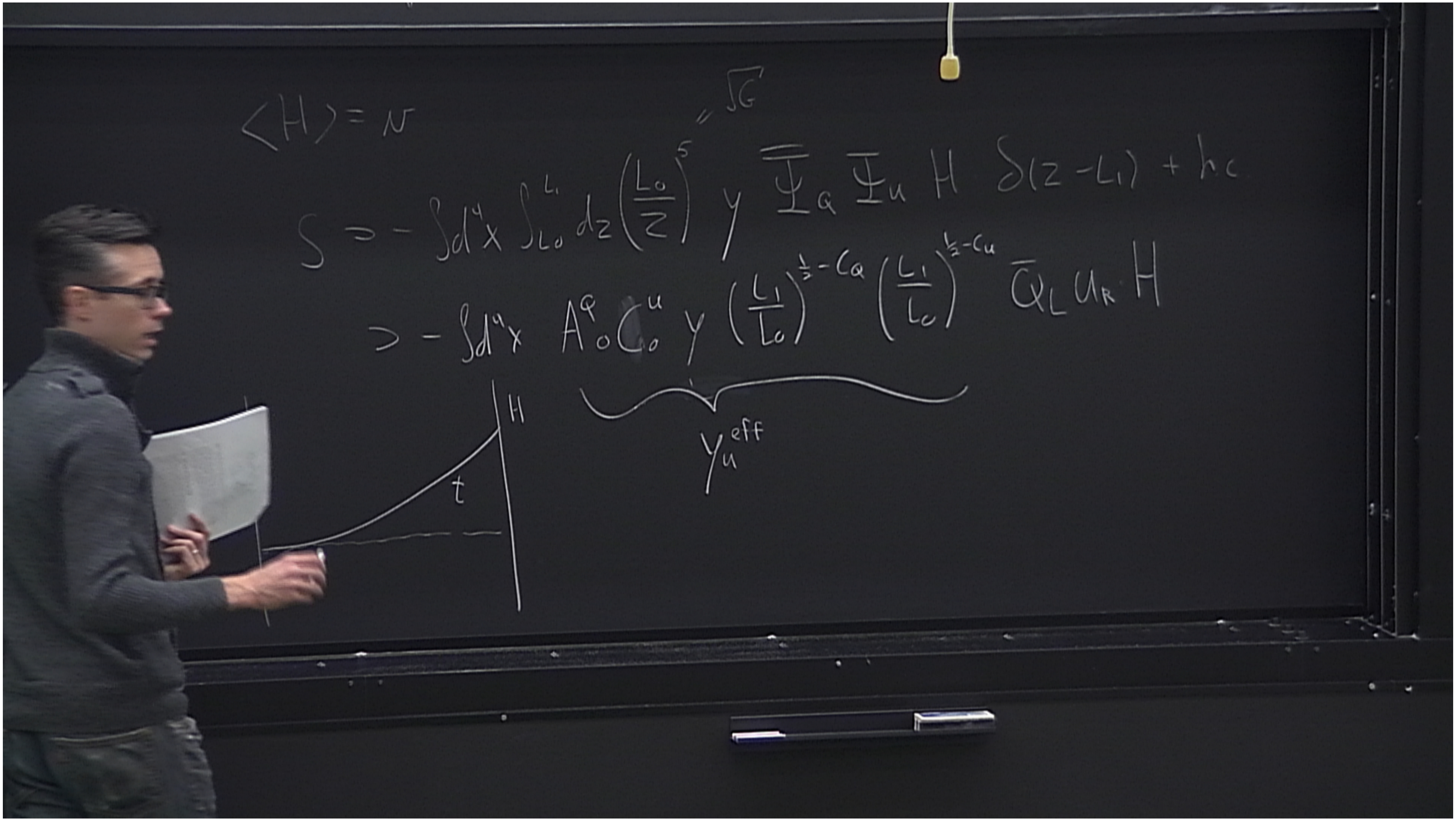
mode

KK

$$\langle H \rangle = v$$

$$S \supset -\int d^4x \int_{L_0}^{L_1} dz \underbrace{\left(\frac{L_0}{z}\right)^5}_{=\sqrt{G}} y\, \bar{\Psi}_Q \Psi_u H\, \delta(z - L_1) + h.c.$$

$$\supset -\int d^4x\, \underbrace{A^Q_0 C^u_0\, y \left(\frac{L_1}{L_0}\right)^{\frac{1}{2} - c_Q} \left(\frac{L_1}{L_0}\right)^{\frac{1}{2} - c_u}}_{y_u^{eff}} \bar{Q}_L u_R H$$



$\langle H \rangle = v$
$= \sqrt{G}$
$S \supset - \int d^4x \int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right)^5 y \, \bar{\Psi}_Q \Psi_u H \, \delta(z - L_1) + h.c.$
$\supset - \int d^4x \, A^q_0 C^u_0 \, y \left(\frac{L_1}{L_0}\right)^{\frac{1}{2} - c_Q} \left(\frac{L_1}{L_0}\right)^{\frac{1}{2} - c_u} \bar{Q}_L u_R H$
y_u^{eff}
H
t

$\langle H \rangle = v$

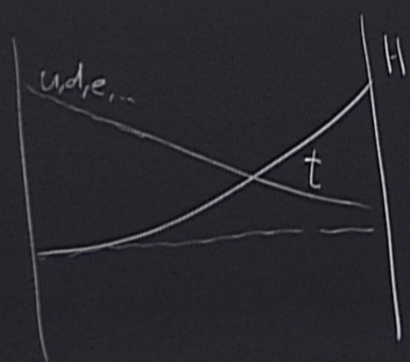
$= \sqrt{G}$

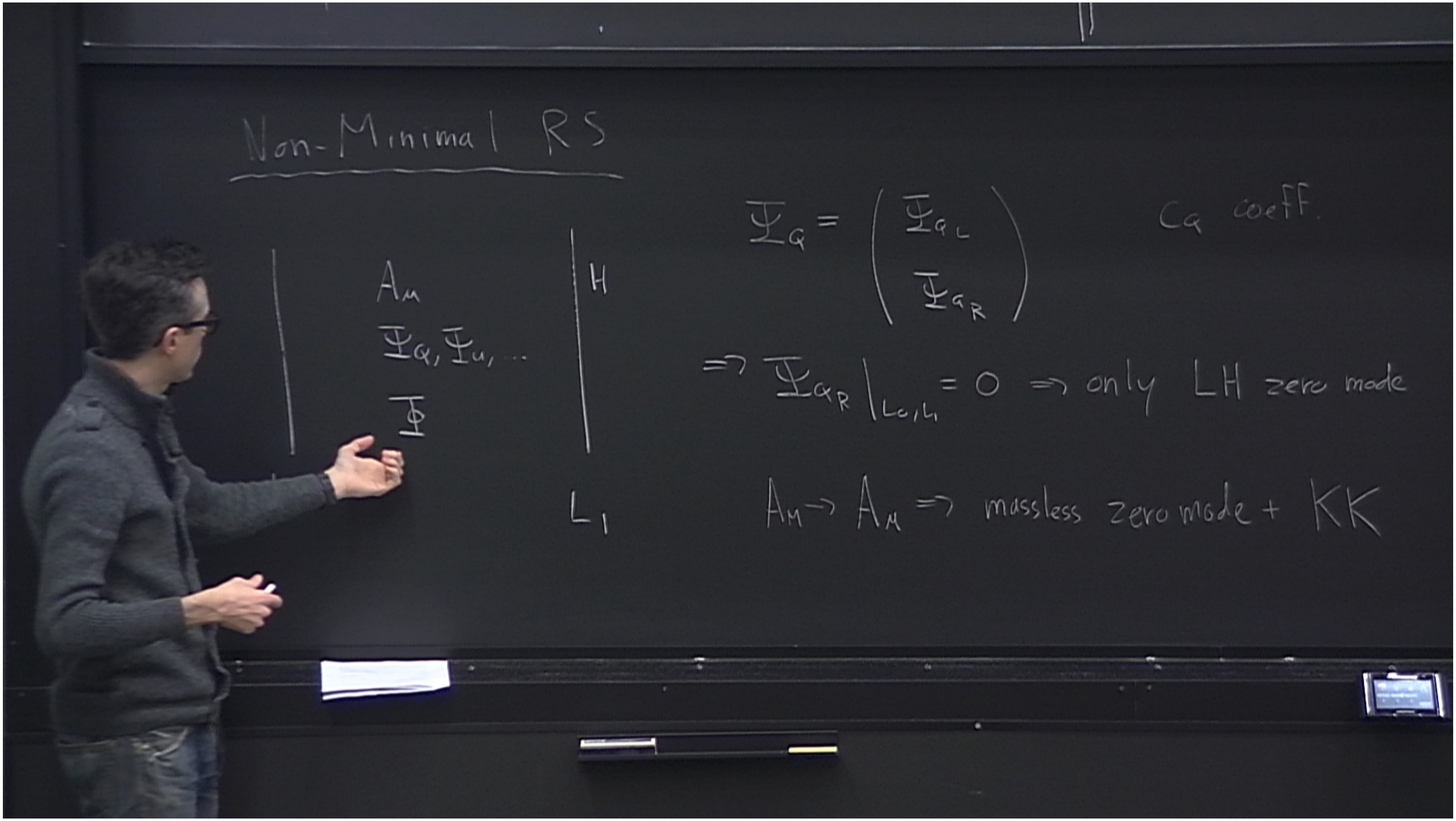
$$S \supset -\int d^4x \int_{L_0}^{L_1} dz \left(\frac{L_0}{z}\right)^5 y\, \bar{\Psi}_Q \Psi_u H\, \delta(z - L_1) + h.c.$$

$$\supset -\int d^4x\, \underbrace{A_0^q C_0^u\, y \left(\frac{L_1}{L_0}\right)^{\frac{1}{2} - c_Q} \left(\frac{L_1}{L_0}\right)^{\frac{1}{2} - c_u}}_{y_u^{eff}} \bar{Q}_L u_R H$$

mode

KK





Non-Minimal RS
A_M
$\Psi_Q, \Psi_u, \ldots$
Φ
H
L_1
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