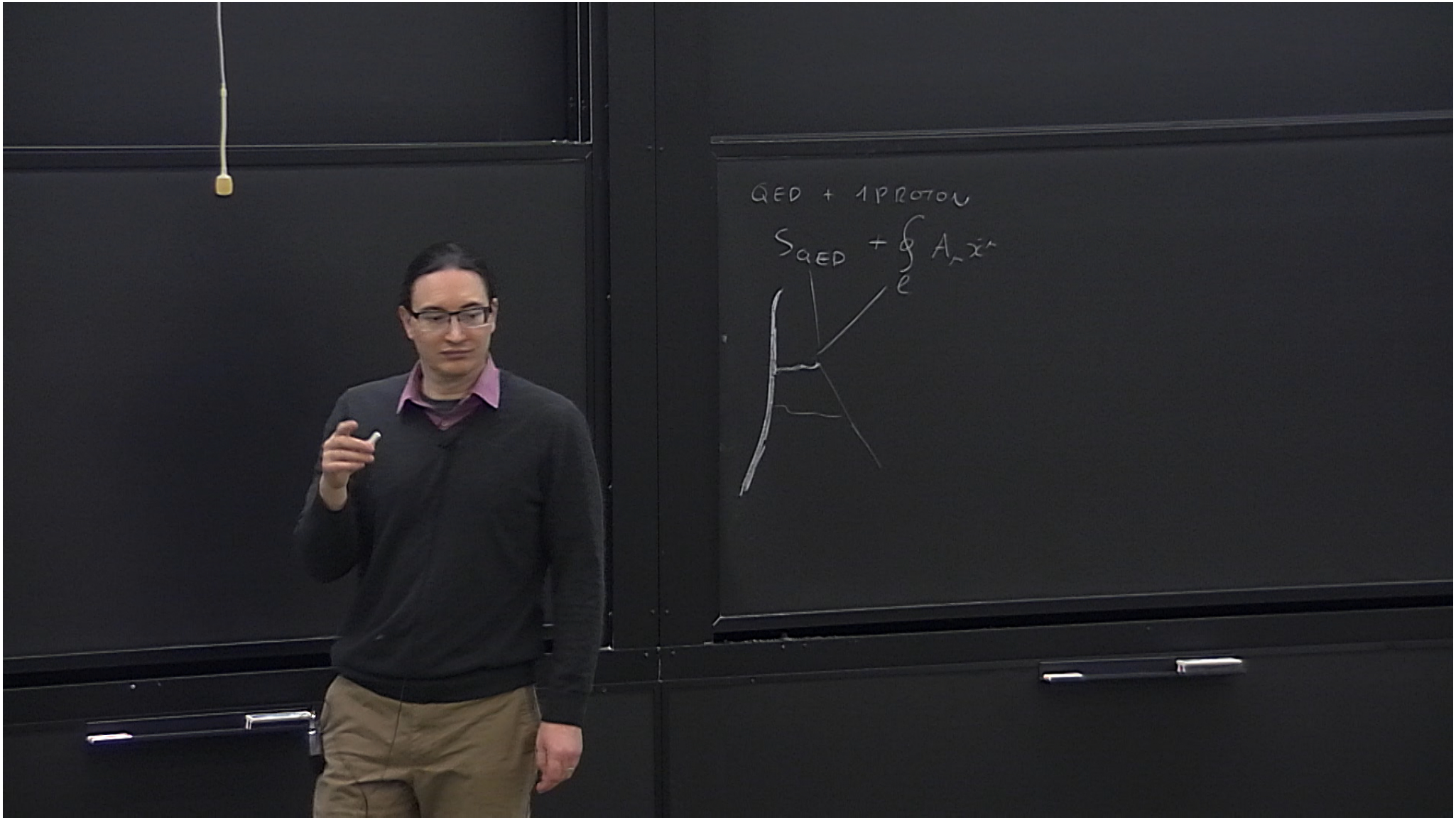
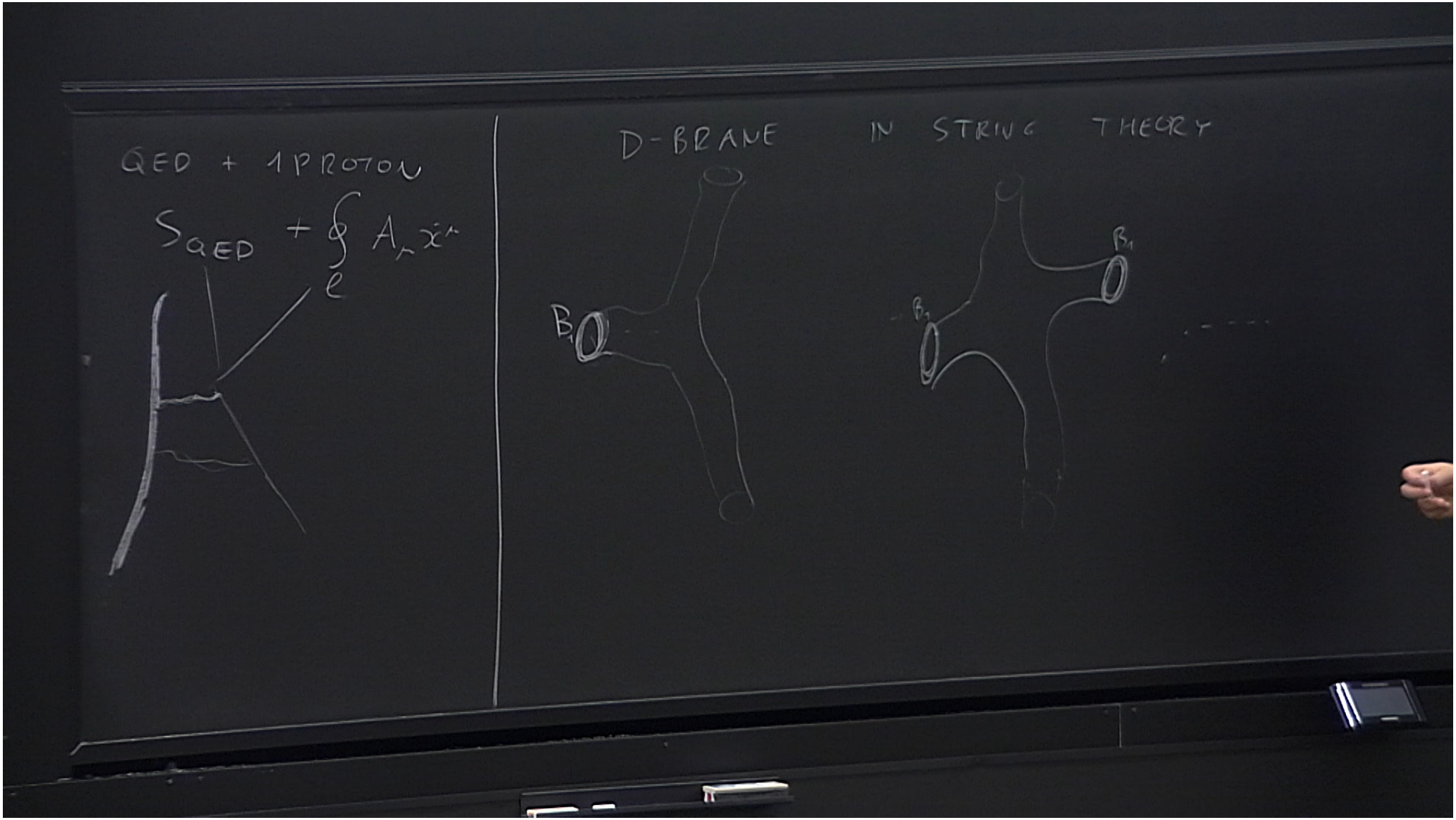
Title: PSI 2016/2017 String Theory (Review) - Lecture 11

Date: Mar 08, 2017 10:00 AM

URL: http://pirsa.org/17030027

Abstract:

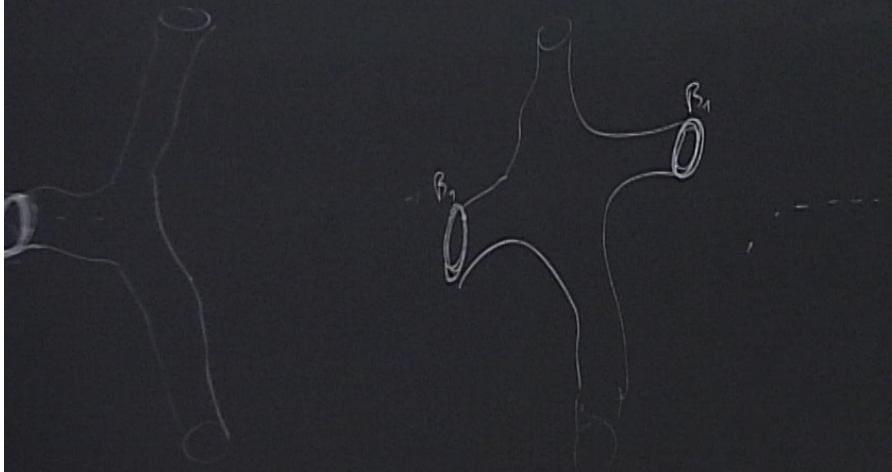

QED + 1 PROTON
$S_{QED} + \oint_e A_\mu \dot{x}^\mu$

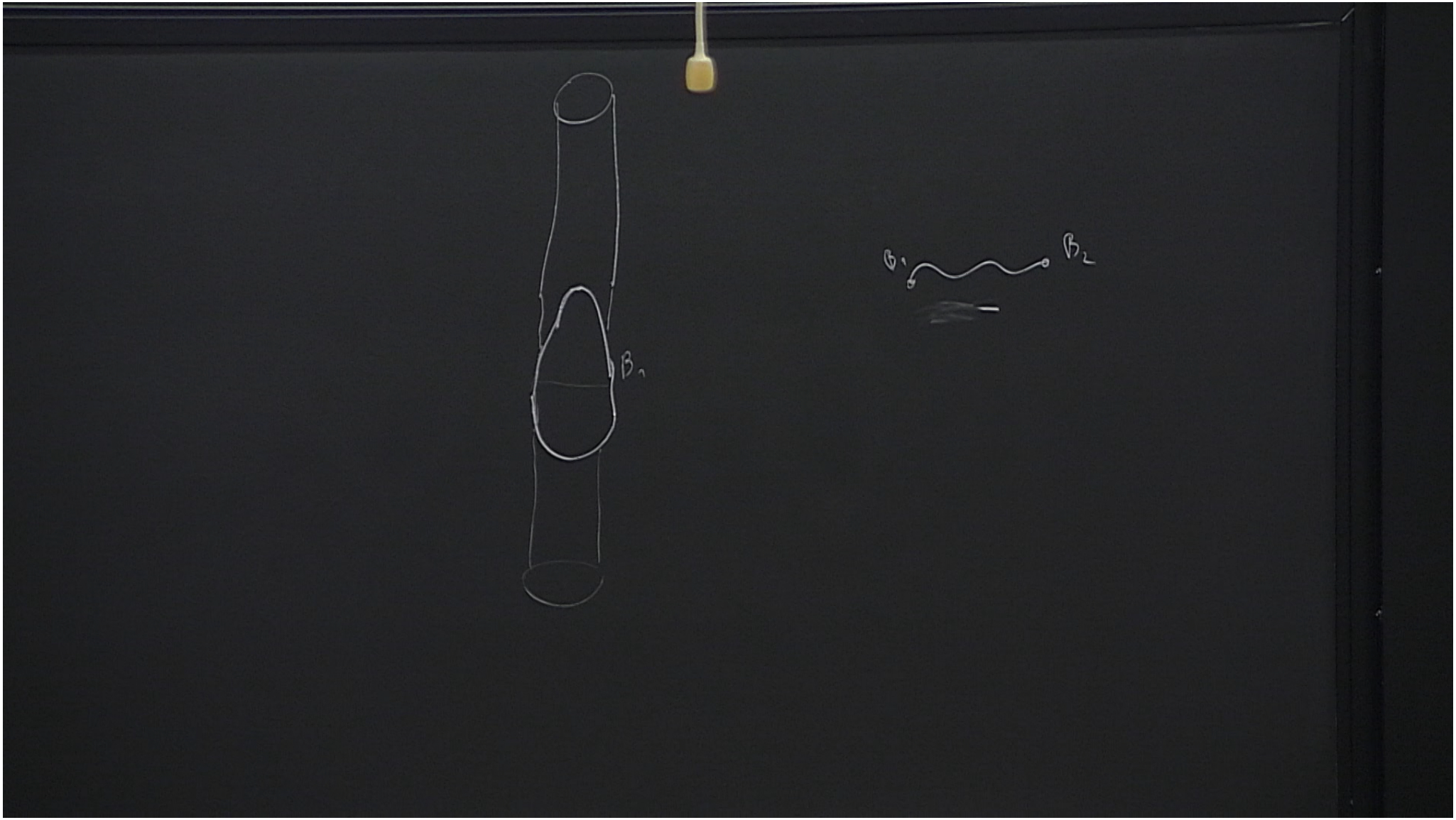

QED + 1 PROTON
$S_{QED} + \oint_e A_\mu \dot{x}^\mu$
D-BRANE IN STRING THEORY
B
B
B

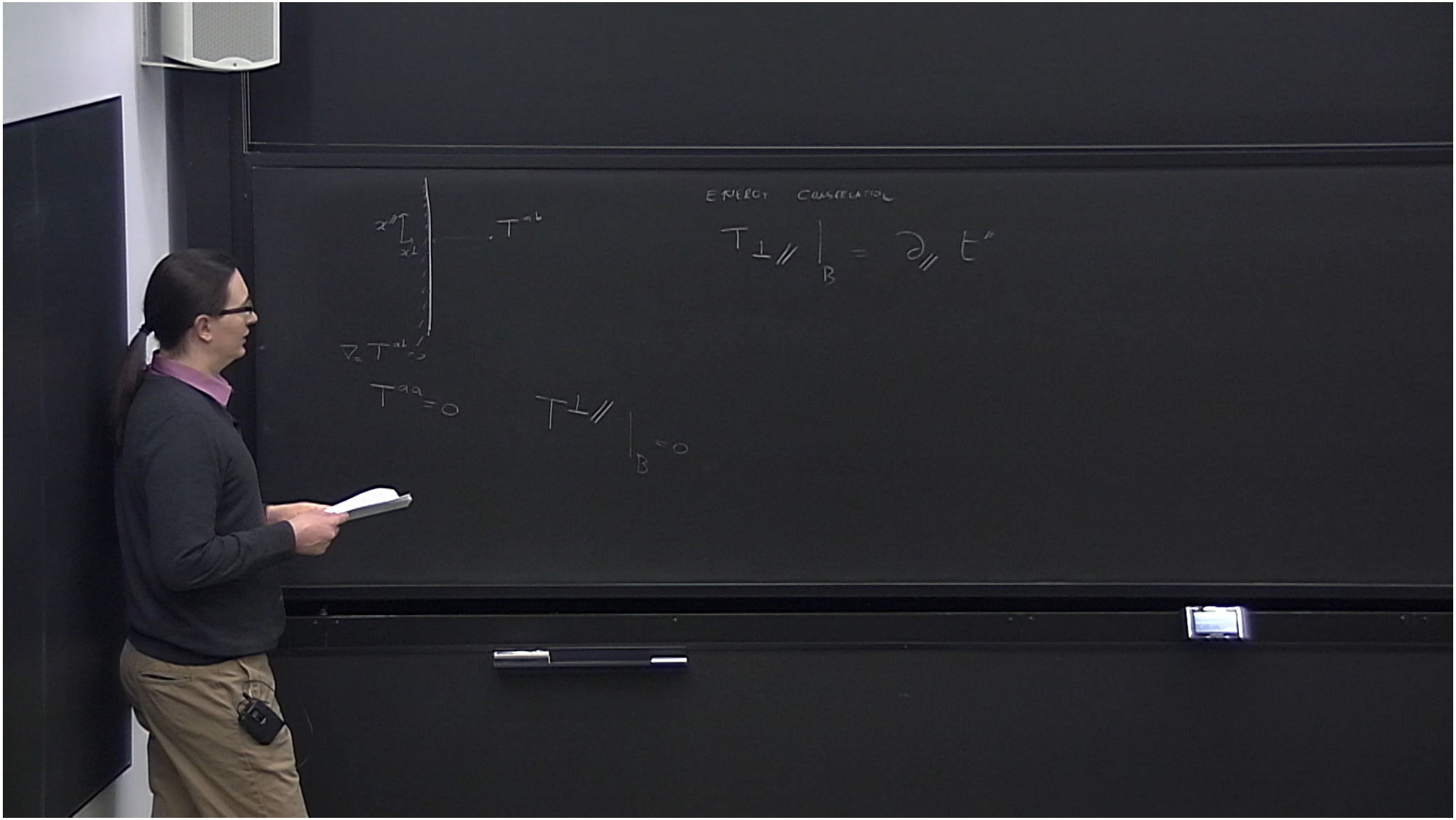
D-BRANE IN STRING THEORY

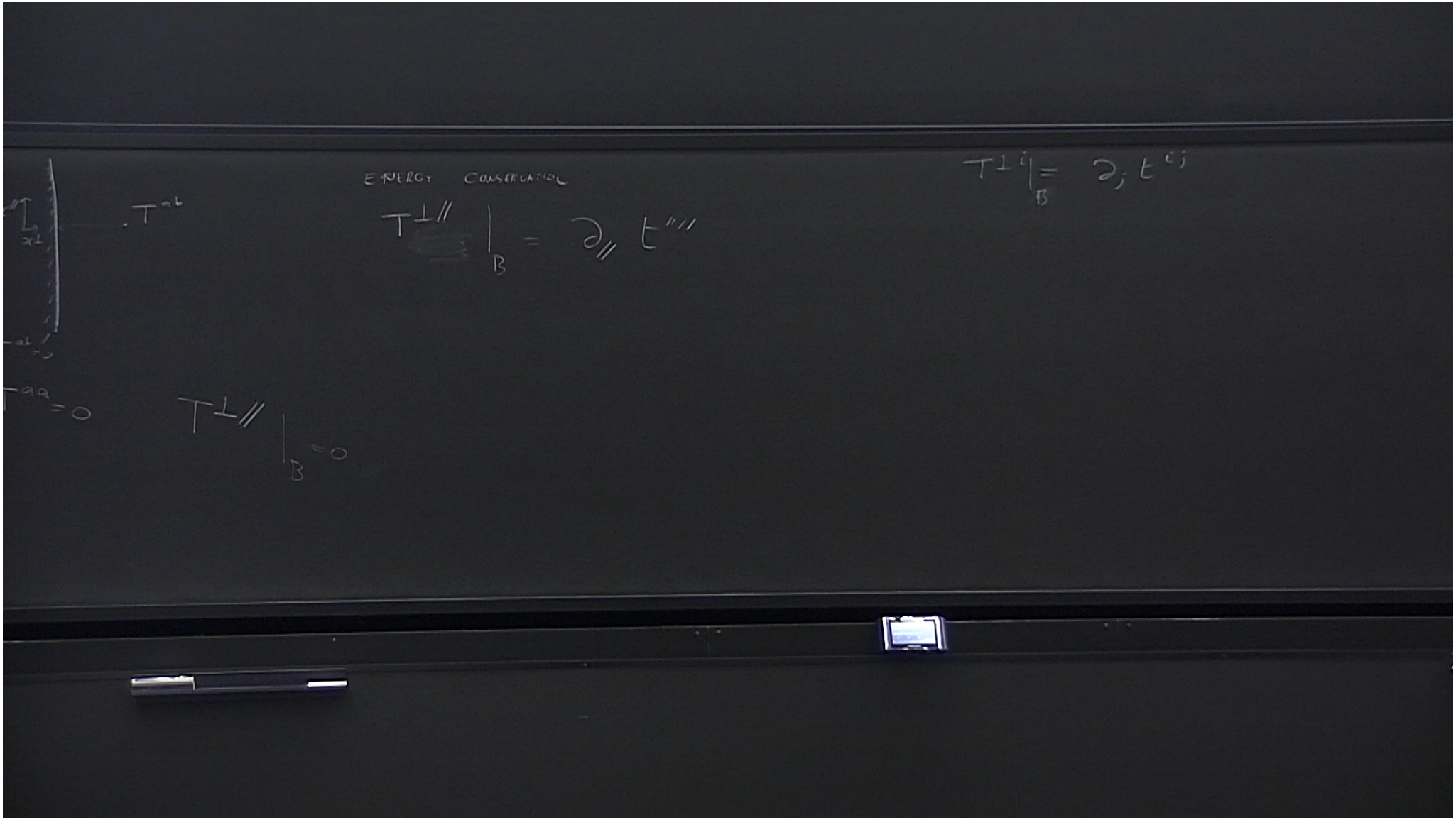
$$\sum_{g} \sum_{b} g_s^{2g+n+b-2} A_{g,b,n}[B_n, \ldots B_1]$$

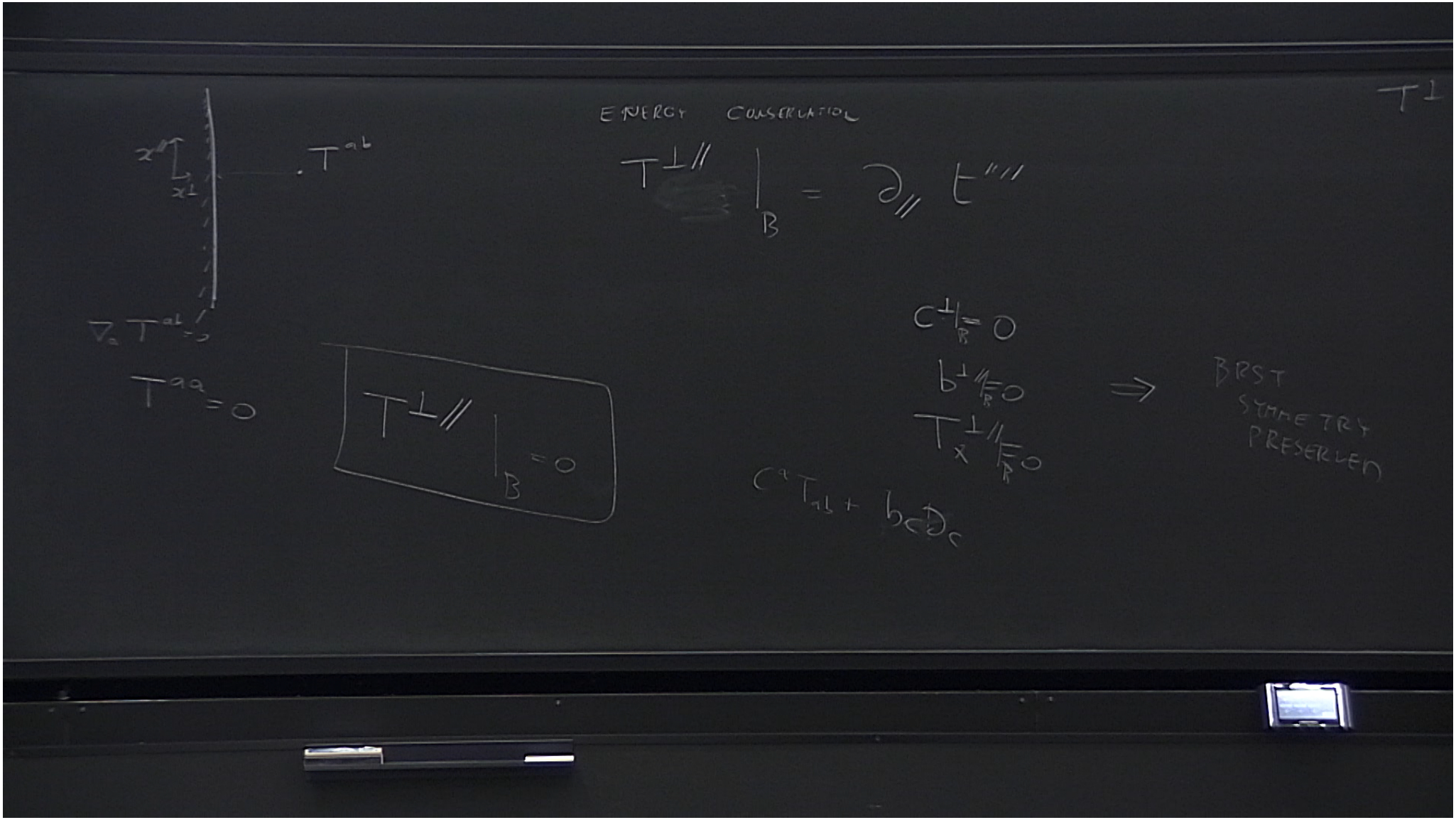
g # HANDLES b # BOUNDARIES

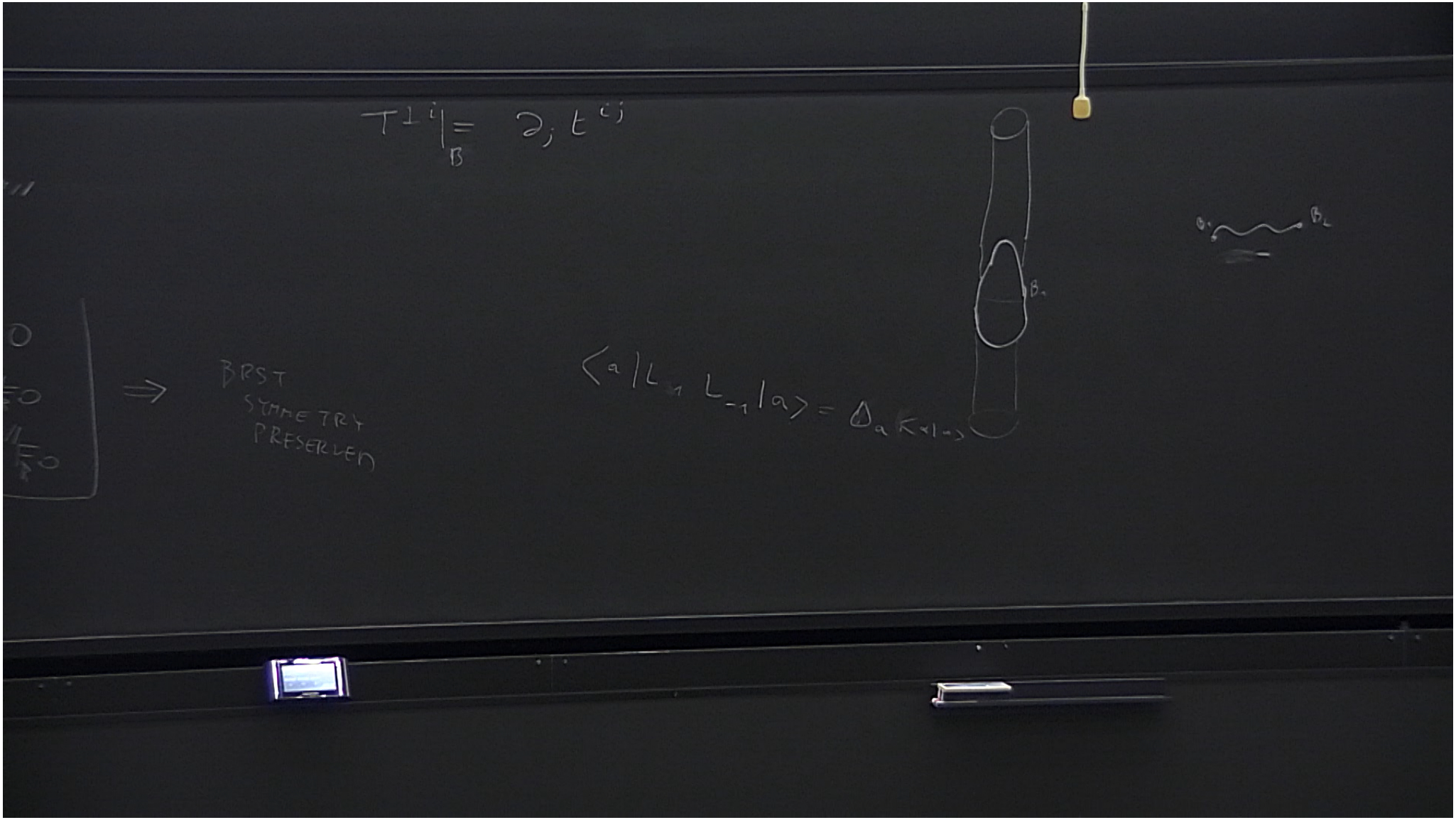



B1
B1
B2

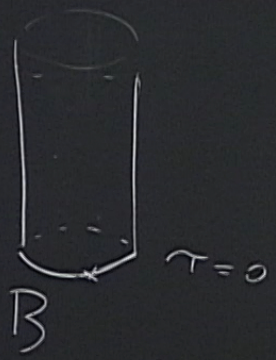

ENERGY CONSERVATION
T^{ab}
$\nabla_a T^{ab} = 0$
$T^{aa} = 0$
$T_{\perp /\!/}\big|_B = \partial_{/\!/} t''$
$T^{\perp /\!/}\big|_B = 0$

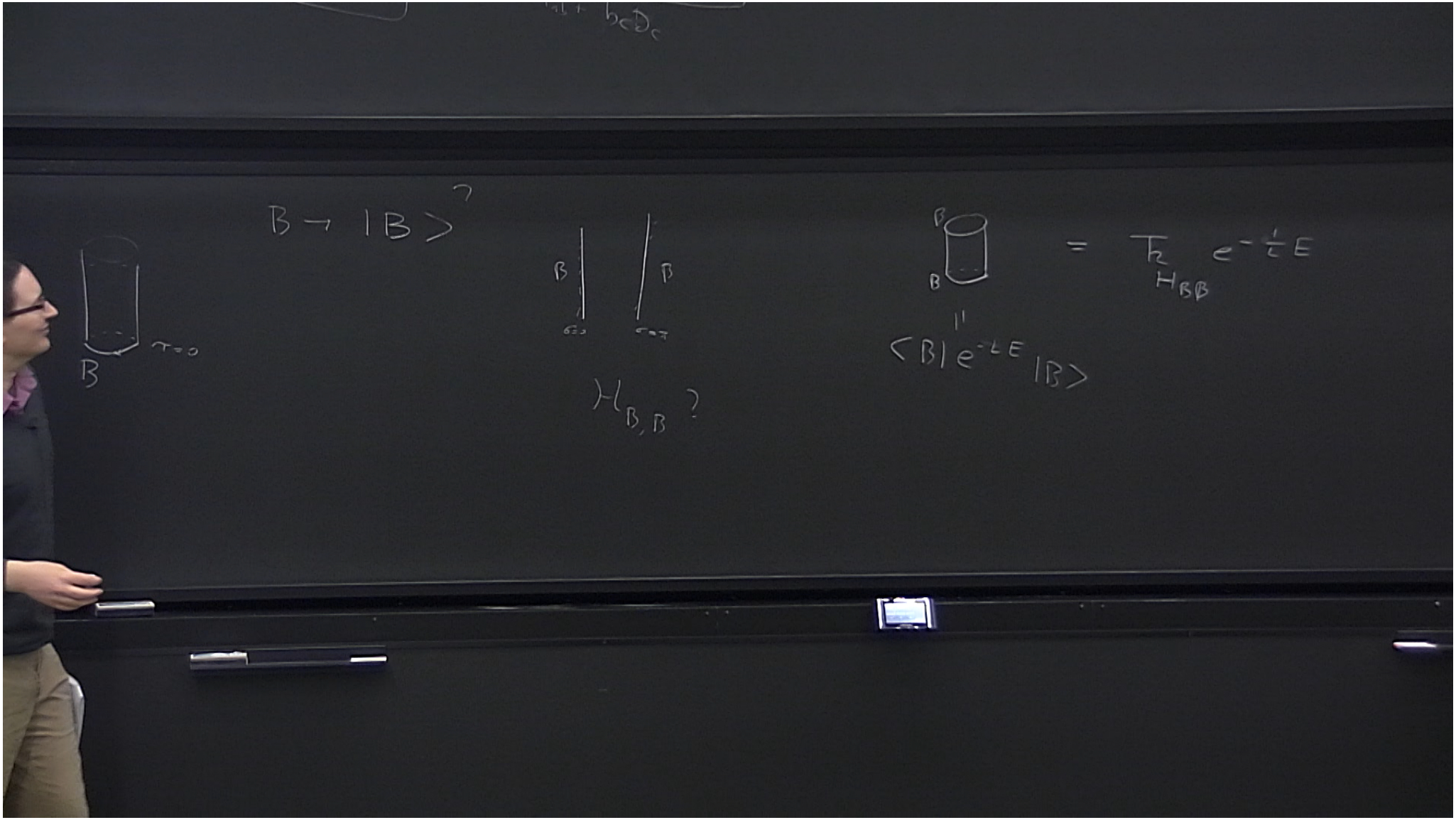

ENERGY CONSERVATION
T^{ab}
$T^{\perp\parallel}|_B = \partial_\parallel t^{\parallel\parallel}$
$T^{\perp i}|_B = \partial_j t^{ij}$
$T^{ab} = 0$
$T^{\perp\parallel}|_B = 0$

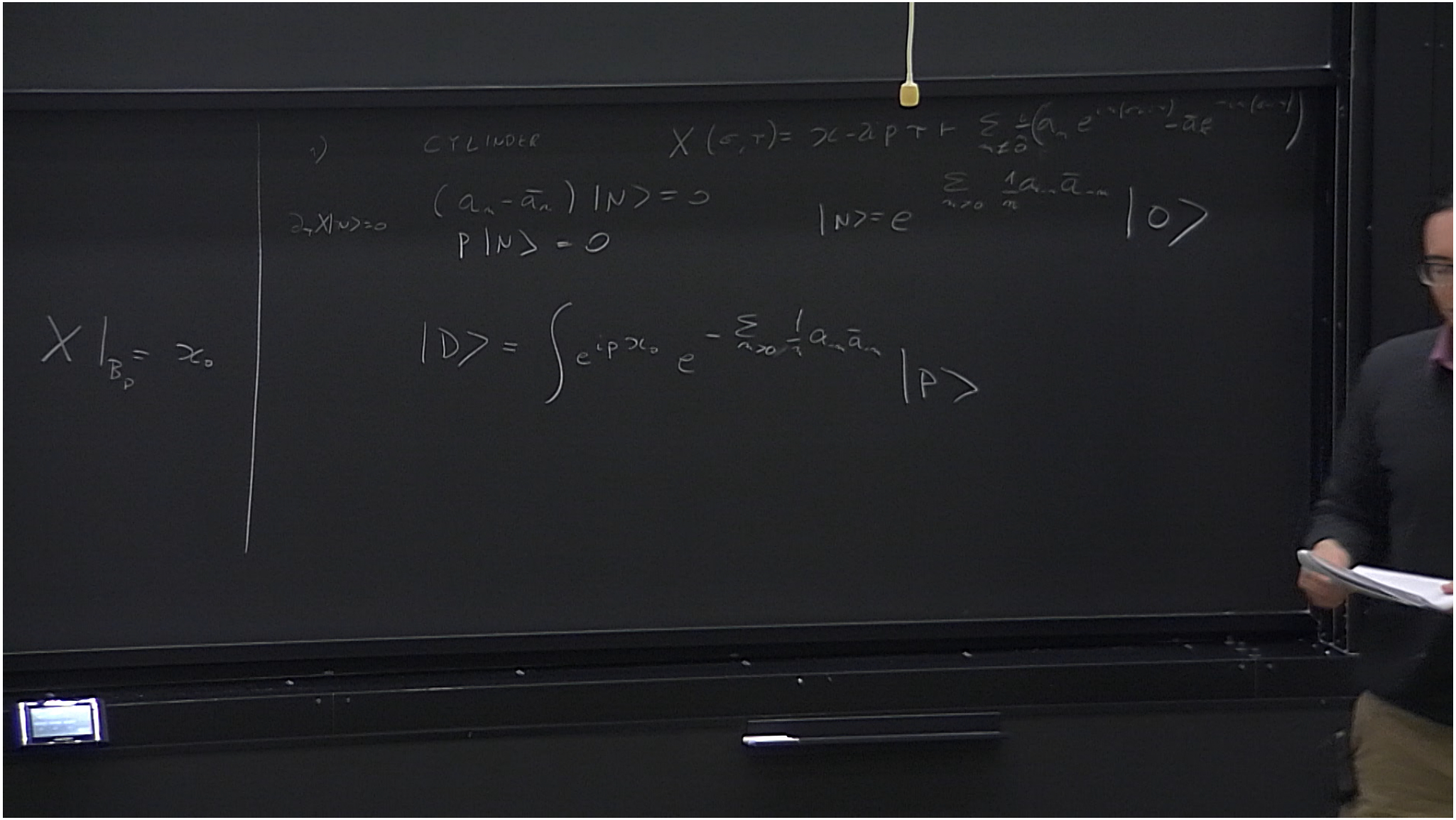

ENERGY CONSERVATION
T^{ab}
$\nabla_a T^{ab} = 0$
$T^{aa} = 0$
$T^{\perp\parallel}|_B = 0$
$T^{\perp\parallel}|_B = \partial_\parallel t^{\parallel\parallel}$
$c^{\perp}|_B = 0$
$b^{\perp\parallel}|_B = 0$
$T_x^{\perp\parallel}|_B = 0$
$\Rightarrow$
BRST SYMMETRY PRESERVED
$c^a T_{ab} + b c \partial_c$

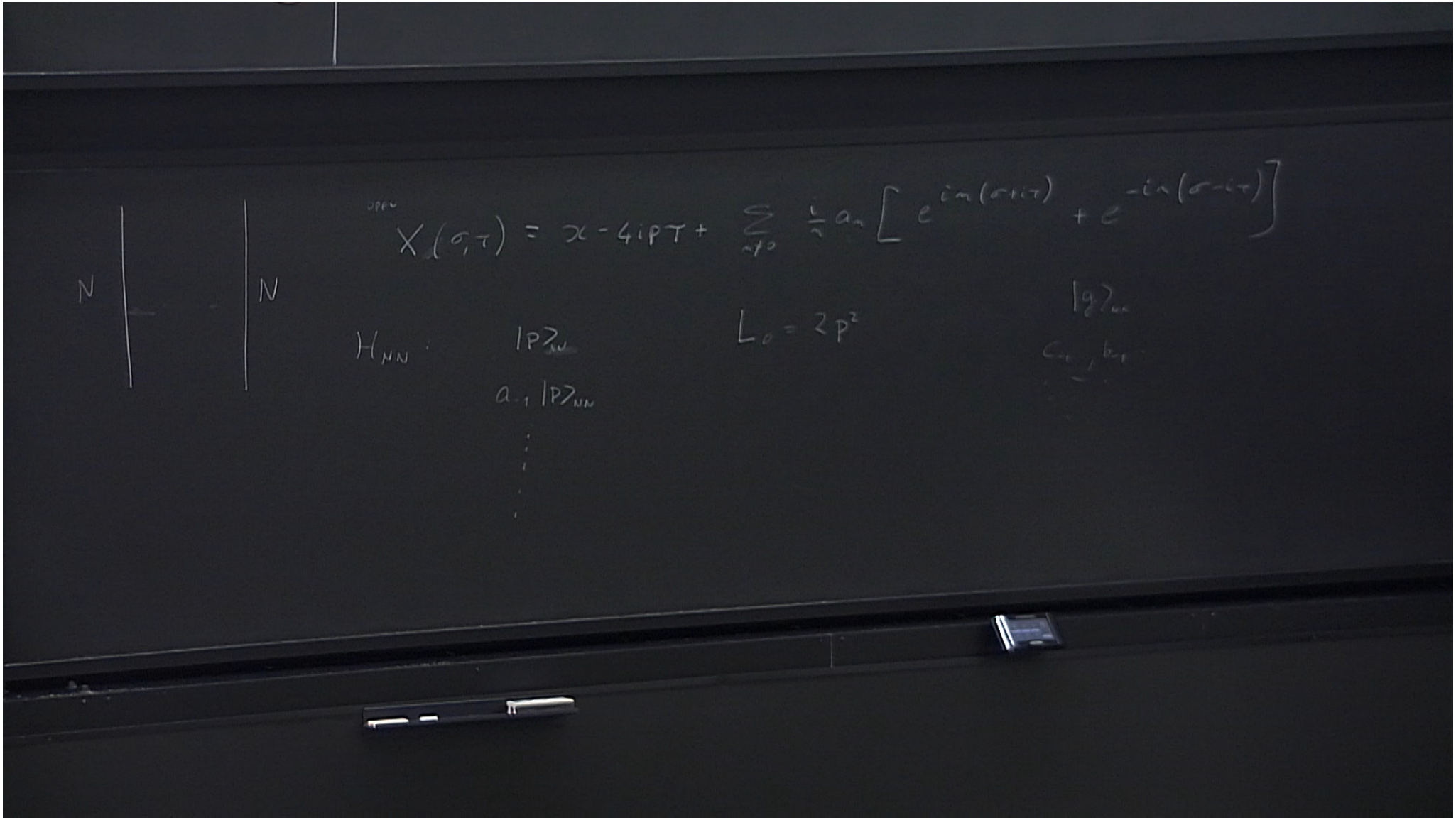

$T^{1\,i}|_B = \partial_j t^{ij}$
$\Rightarrow$
BRST
SYMMETRY
PRESERVED
$\langle a | L_1 L_{-1} | a \rangle = \Delta_a K_{(1-)}$

$B \rightarrow |B\rangle$




B → |B>
B
B
B
B
B
= T
H_BB
e^{-1/t E}
<B| e^{-t E} |B>
H_{B,B} ?


1) CYLINDER
$X(\sigma,\tau) = x - 2\alpha' p\tau + \dots$
$(a_n - \bar{a}_n)|N\rangle = 0$
$p|N\rangle = 0$
$|N\rangle = e^{\sum_{n>0} \frac{1}{n} a_{-n}\bar{a}_{-n}}|0\rangle$
$X|_{B_D} = x_0$
$|D\rangle = \int e^{ipx_0} e^{-\sum_{n>0} \frac{1}{n} a_{-n}\bar{a}_{-n}}|p\rangle$

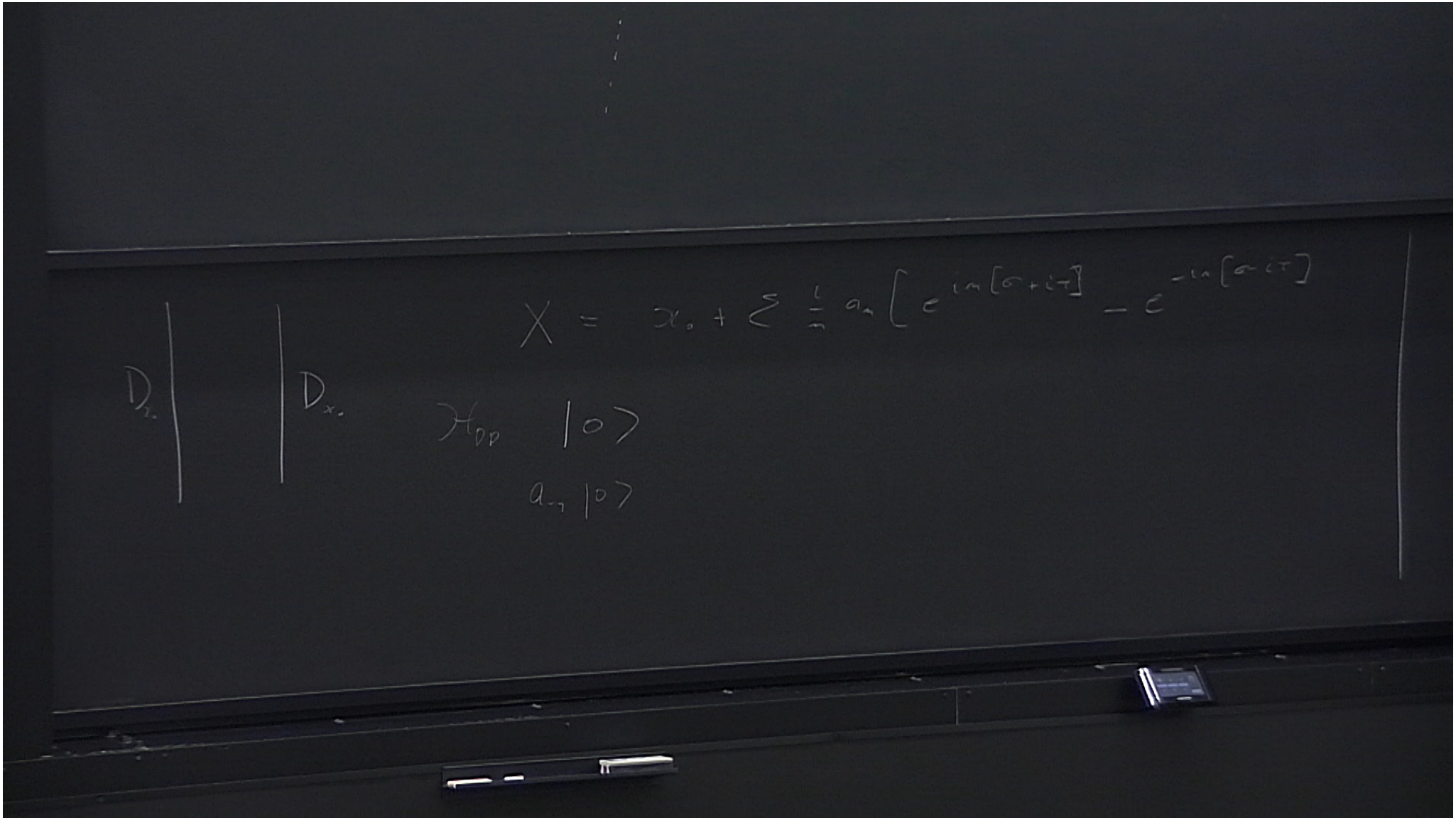

N
N
$X_\pm(\sigma,\tau) = x - 4ip\tau + \sum_{n\neq 0} \frac{i}{n} a_n \left[e^{in(\sigma+\tau)} + e^{-in(\sigma-i\tau)} \right]$
H_{NN} : $|p\rangle_{NN}$
$a_{-1}|p\rangle_{NN}$
$L_0 = 2p^2$
$|g\rangle_{NN}$

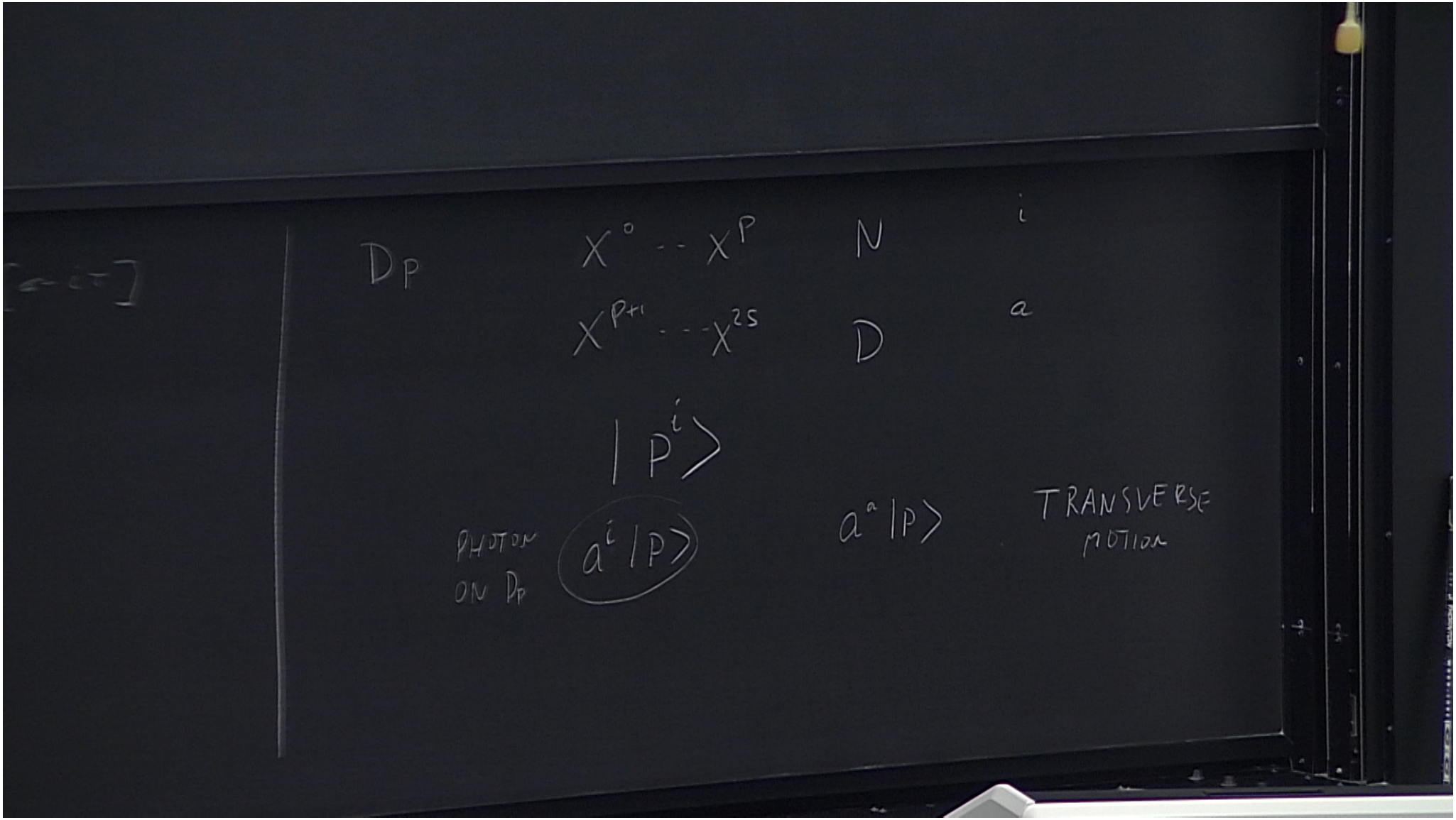
$\alpha(\sigma - i\tau)]$

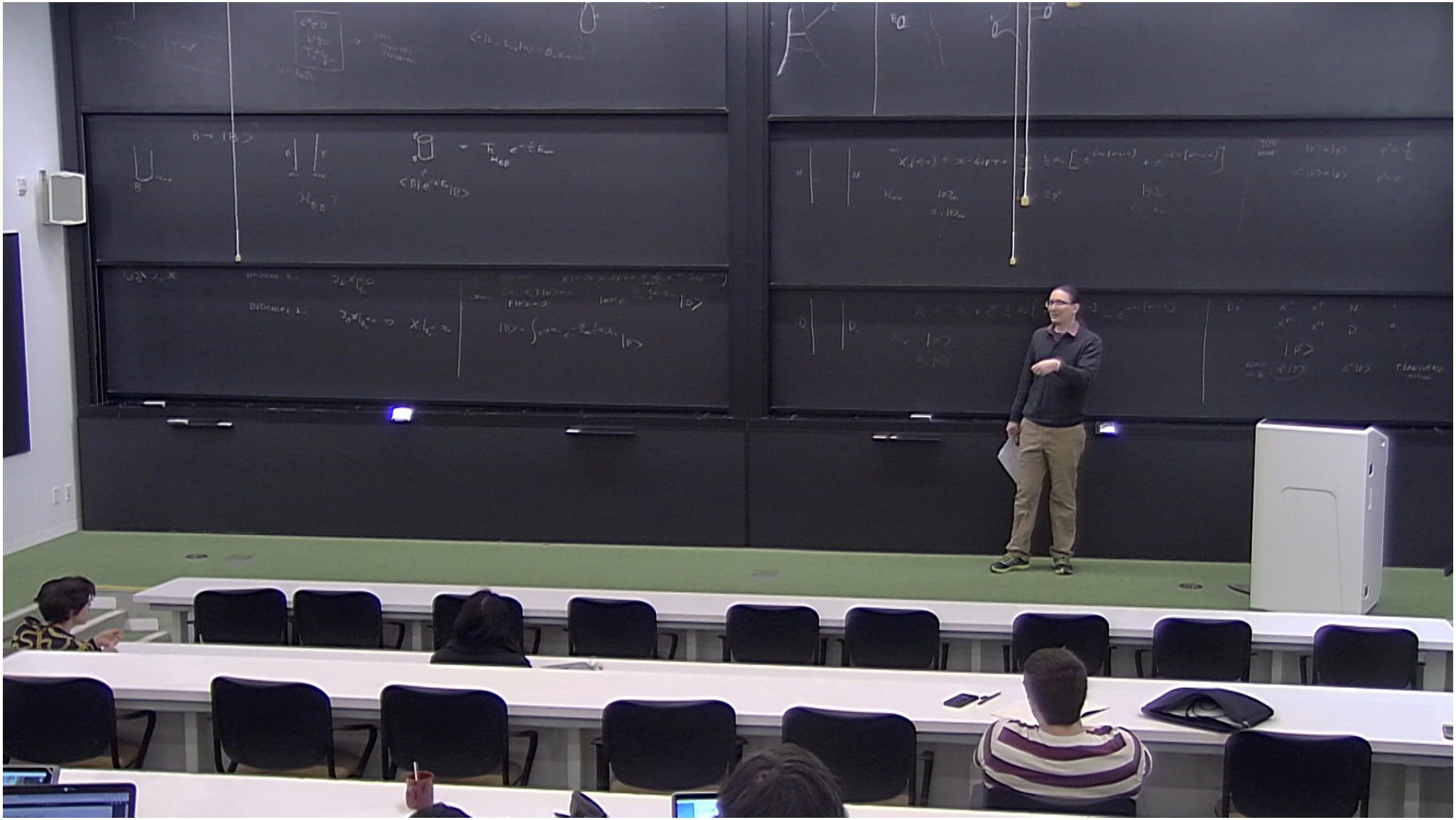
D25
BRANE

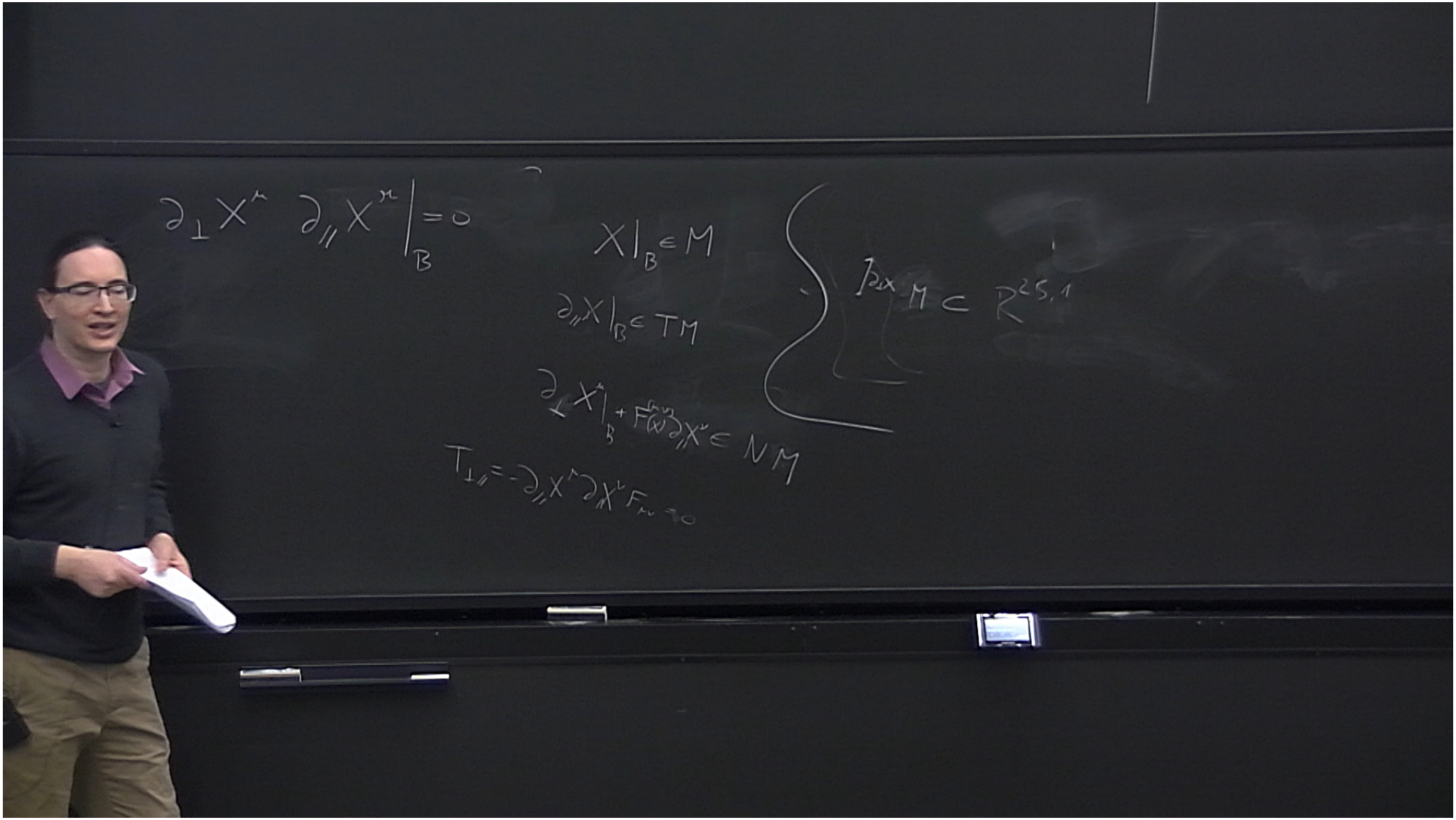
$|p\rangle \otimes |g\rangle$ $\quad p^2 = \frac{1}{2}$

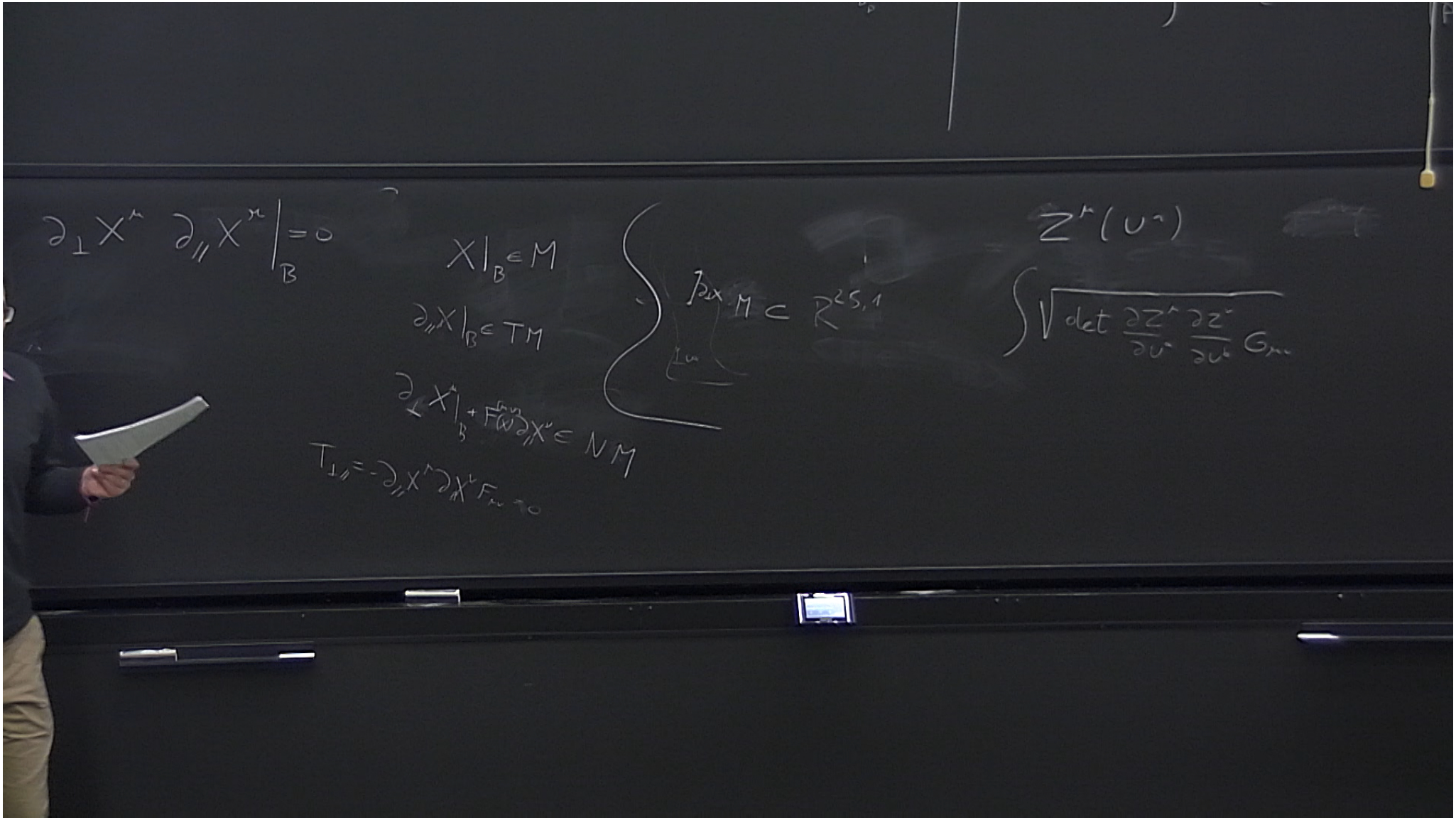
$a_{-1}^{\mu} |p\rangle \otimes |g\rangle$ $\quad p^2 = 0$

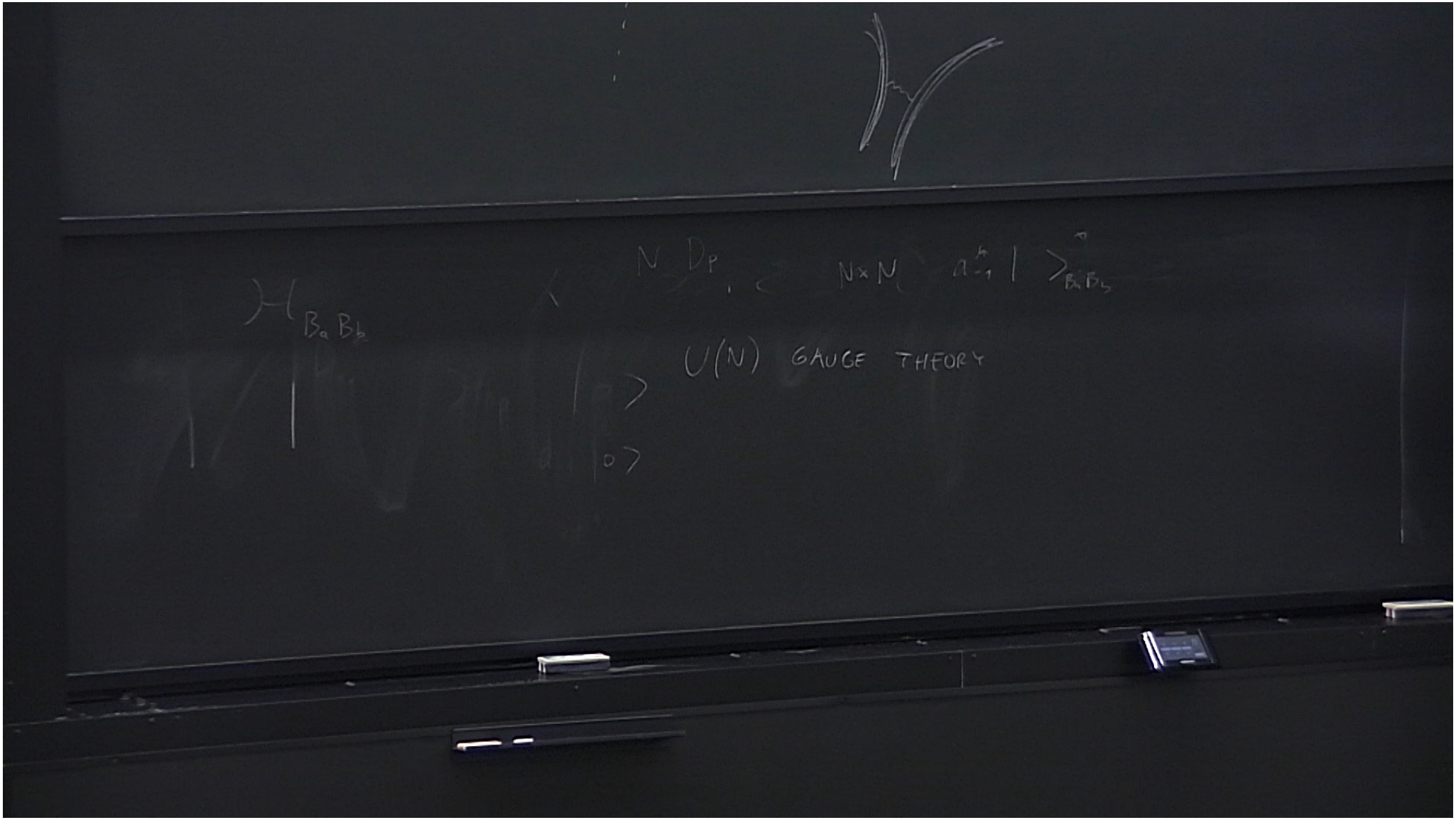

$X = x_0 + \sum \frac{1}{n} a_n \left[e^{in[\sigma + iT]} - e^{-in[\sigma + iT]} \right]$
D_{x_0}
D_{x_0}
$\mathcal{H}_{DD} |0\rangle$
$a_{-1} |0\rangle$


D_p
$X^0 \cdots X^p$
N
i
$X^{p+1} \cdots X^{25}$
D
a
$|p^i\rangle$
PHOTON ON D_p
$a^i|p\rangle$
$a^a|p\rangle$
TRANSVERSE MOTION




$\partial_\perp X^\mu \, \partial_{/\!/} X^\mu \Big|_B = 0$
$X|_B \in M$
$\partial_{/\!/} X|_B \in TM$
$\partial_\perp X^\mu|_B + F^{\mu\nu}\partial_{/\!/} X^\nu \in NM$
$T_{\perp/\!/} = -\partial_{/\!/} X^\mu \partial_{/\!/} X^\nu F_{\mu\nu} = 0$
$\forall x \in M \subset \mathbb{R}^{2,5,1}$


$\partial_\perp X^\mu \, \partial_{/\!/} X^\mu \Big|_B = 0$
$X|_B \in M$
$\partial_{/\!/} X|_B \in TM$
$\partial_\perp X^\mu|_B + F^\mu{}_\nu \partial_{/\!/} X^\nu \in NM$
$T_{\perp/\!/} = -\partial_{/\!/} X^\mu \partial_{/\!/} X^\nu F_{\mu\nu} = 0$
$\int_{\partial\Sigma} M \subset R^{2,1}$
Σ^μ
$Z^\mu(U^\alpha)$
$\int \sqrt{\det \frac{\partial Z^\mu}{\partial U^\alpha} \frac{\partial Z^\nu}{\partial U^\beta} G_{\mu\nu}}$


N D_p
N×N
U(N) GAUGE THEORY