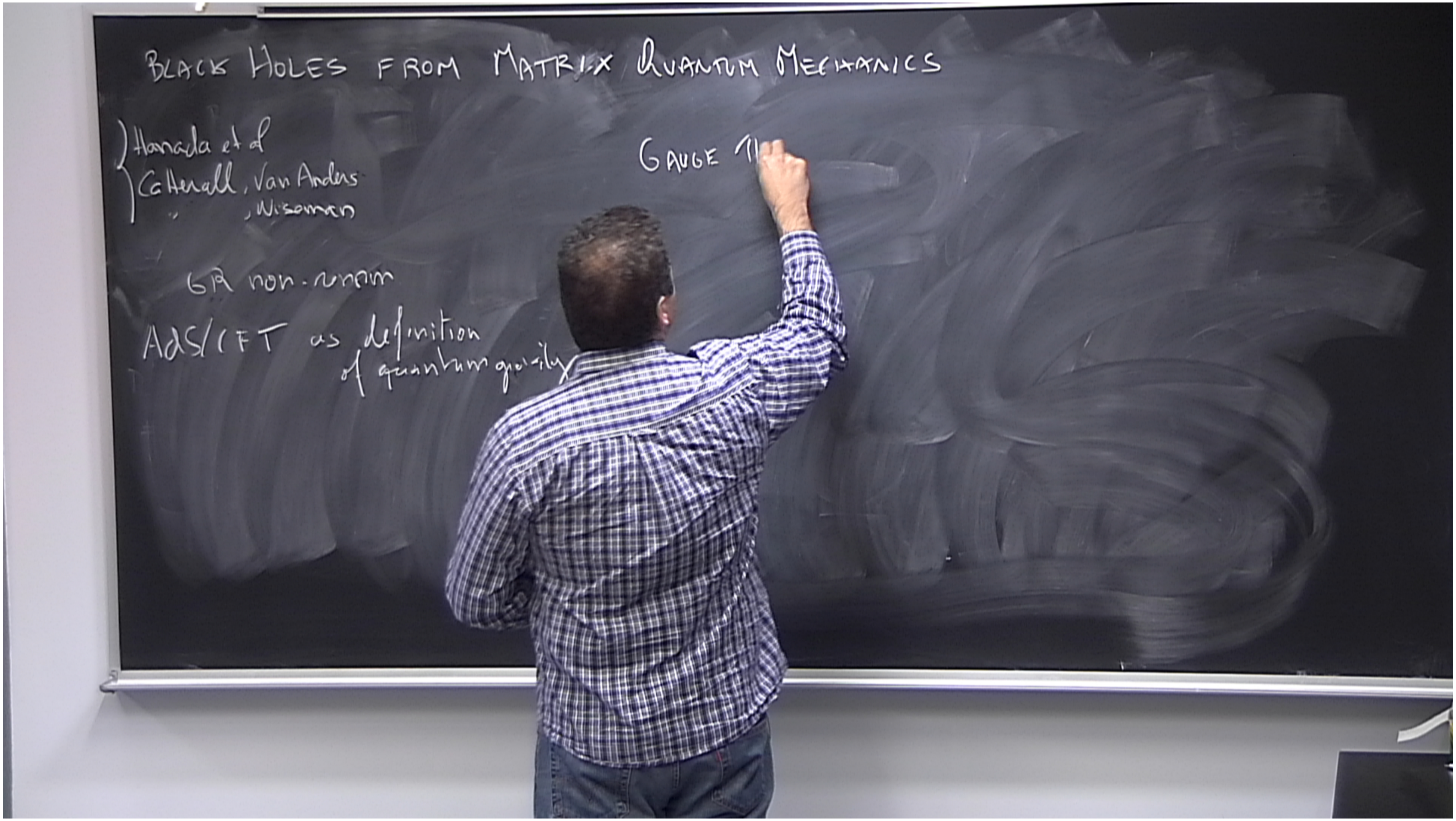
Title: TBA

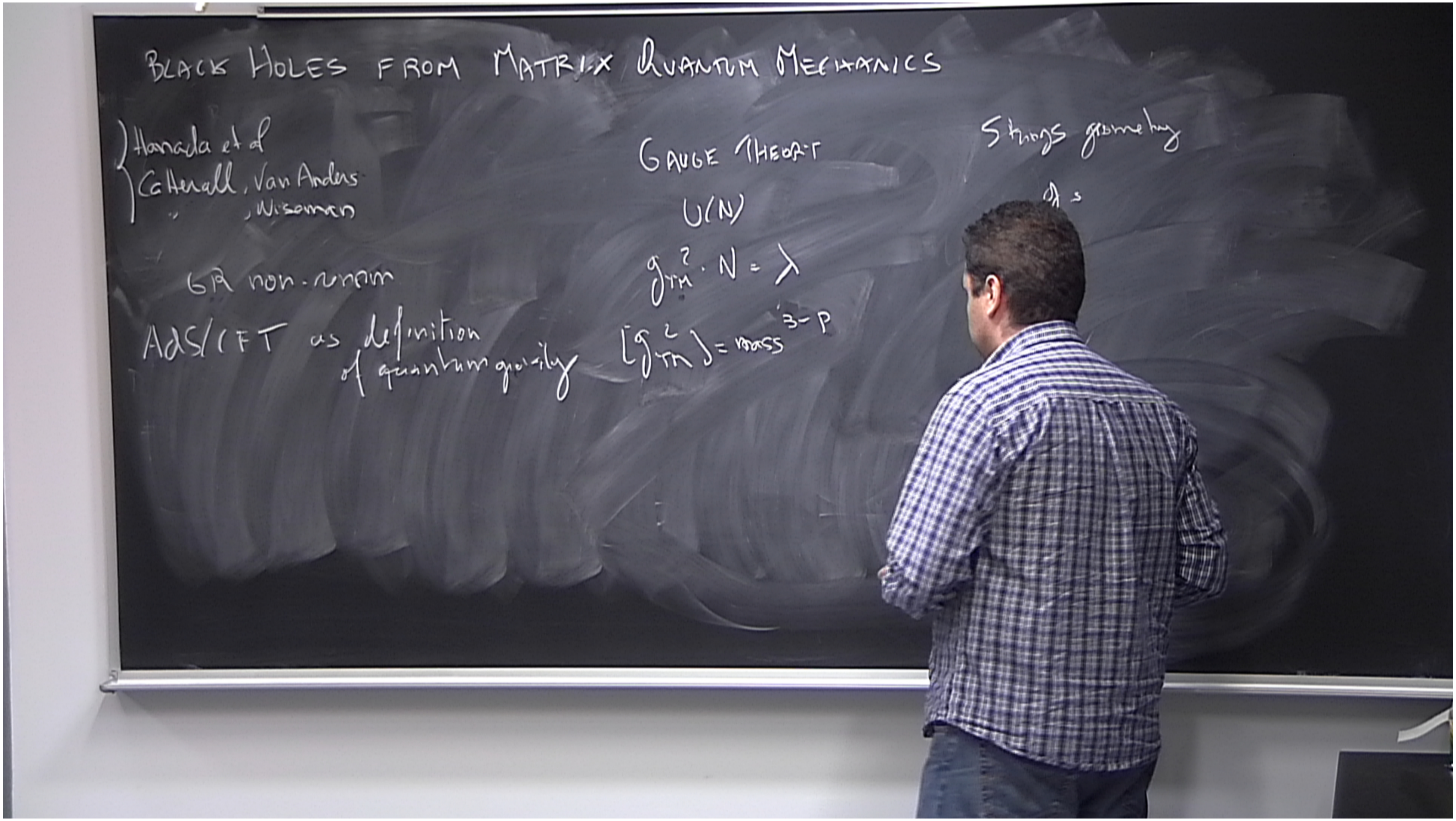
Date: Jun 07, 2012 03:30 PM

URL: http://pirsa.org/12060026

Abstract: TBA



BLACK HOLES FROM MATRIX QUANTUM MECHANICS
Hanada et al
Catterall, Van Anders
, Wiseman
GAUGE
AdS/CFT as definition of quantum gravity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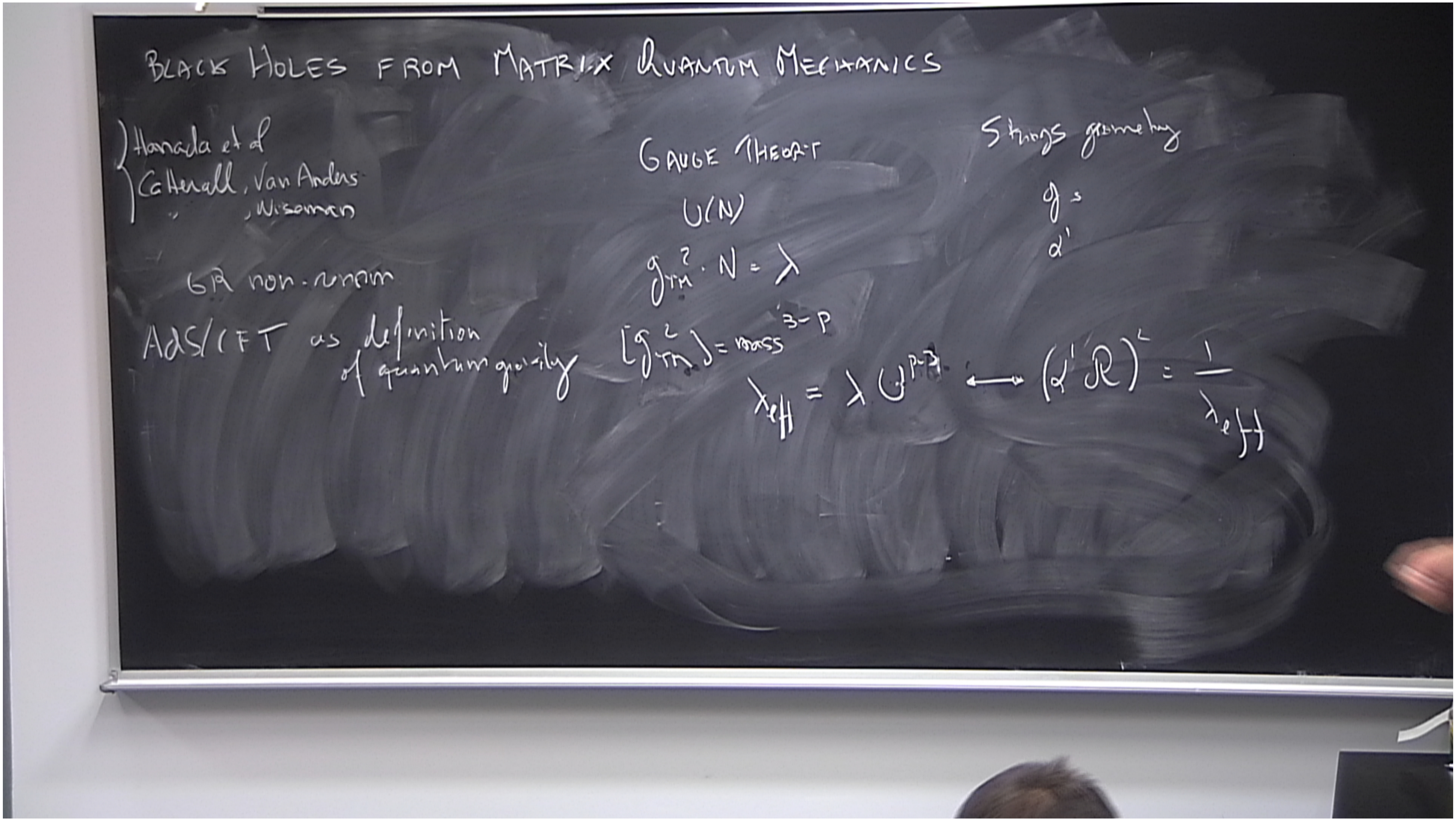
GAUGE THEORY
U(N)
$g_{YM}^2 \cdot N = \lambda$
$[g_{YM}^2] = \text{mass}^{3-p}$
Strings geometry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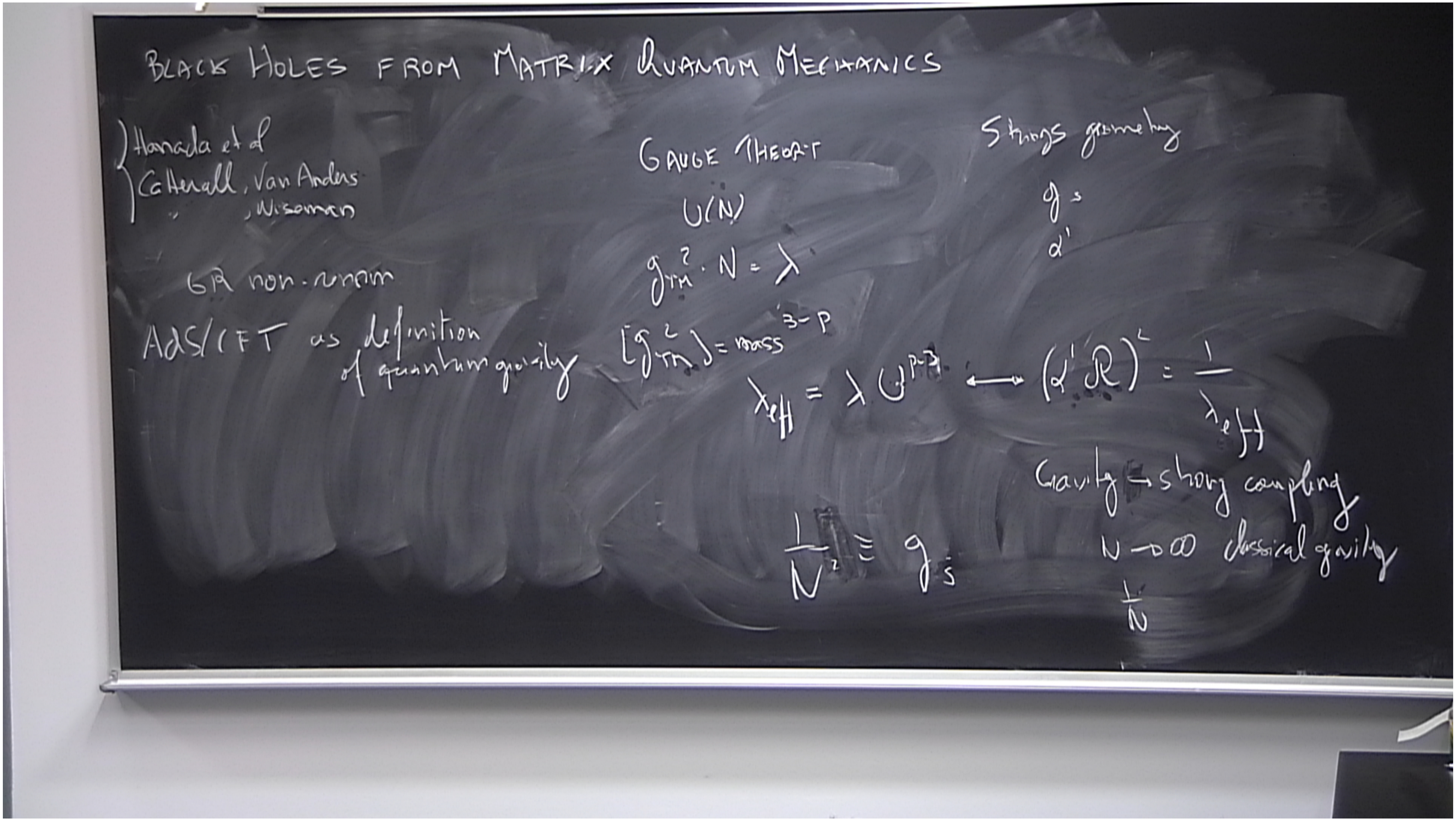
GAUGE THEORY
U(N)
$g_{YM}^2 \cdot N = \lambda$
$[g_{YM}^2] = \text{mass}^{3-p}$
$\lambda_{eff} = \lambda U^{p-3} \longleftrightarrow (\alpha' R)^2 = \frac{1}{\lambda_{eff}}$
Strings geometry
g_s
α'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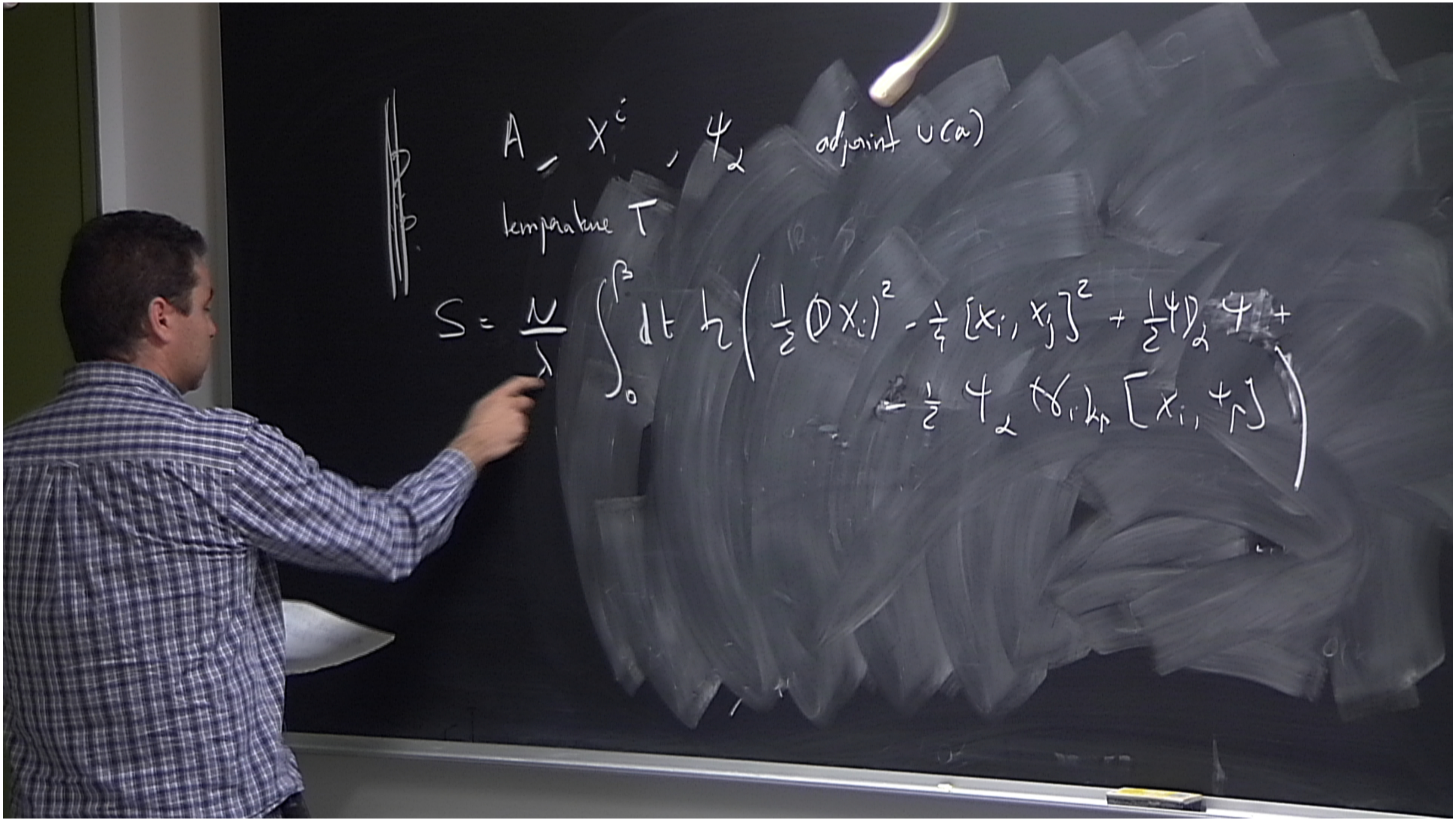
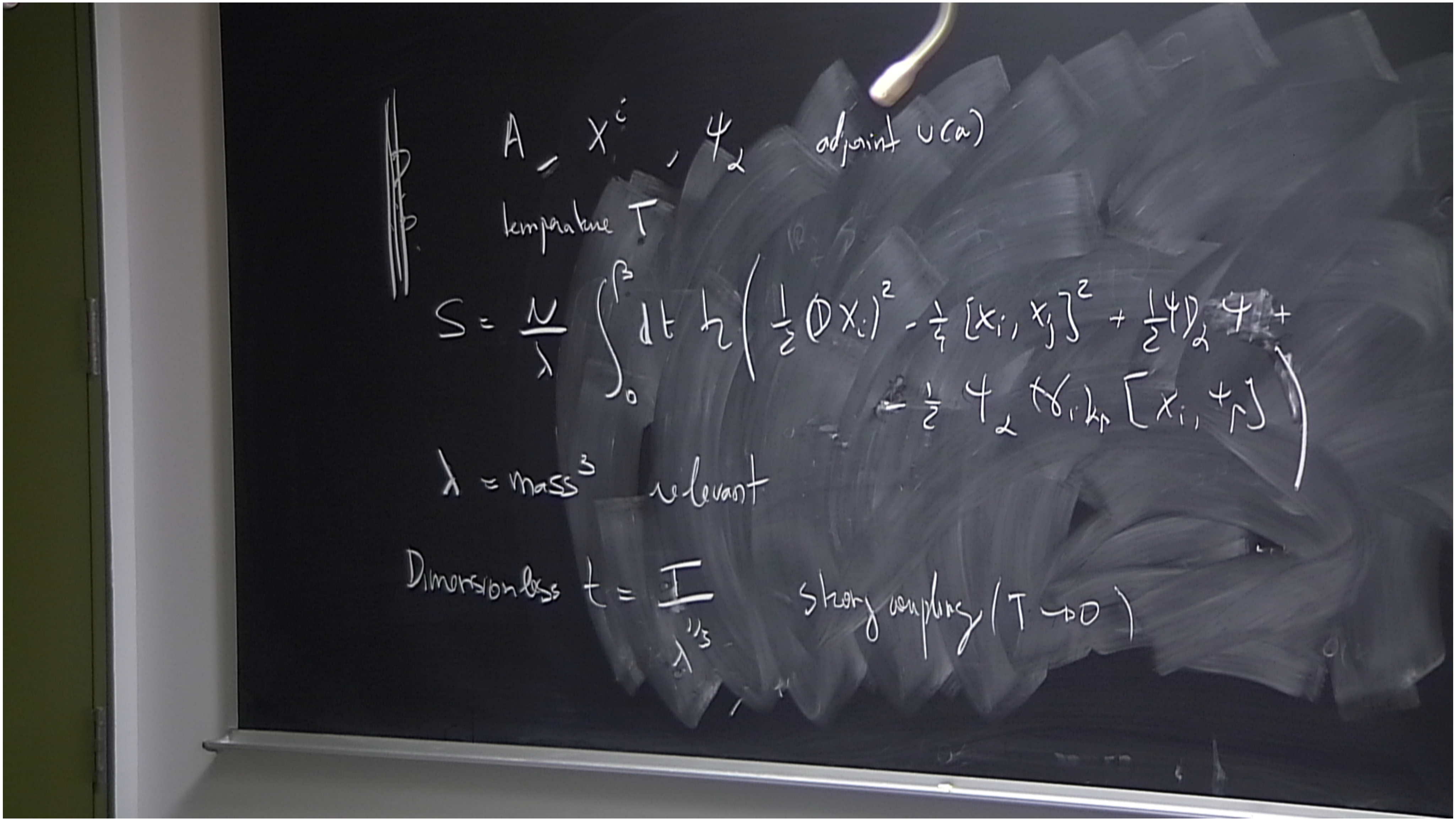
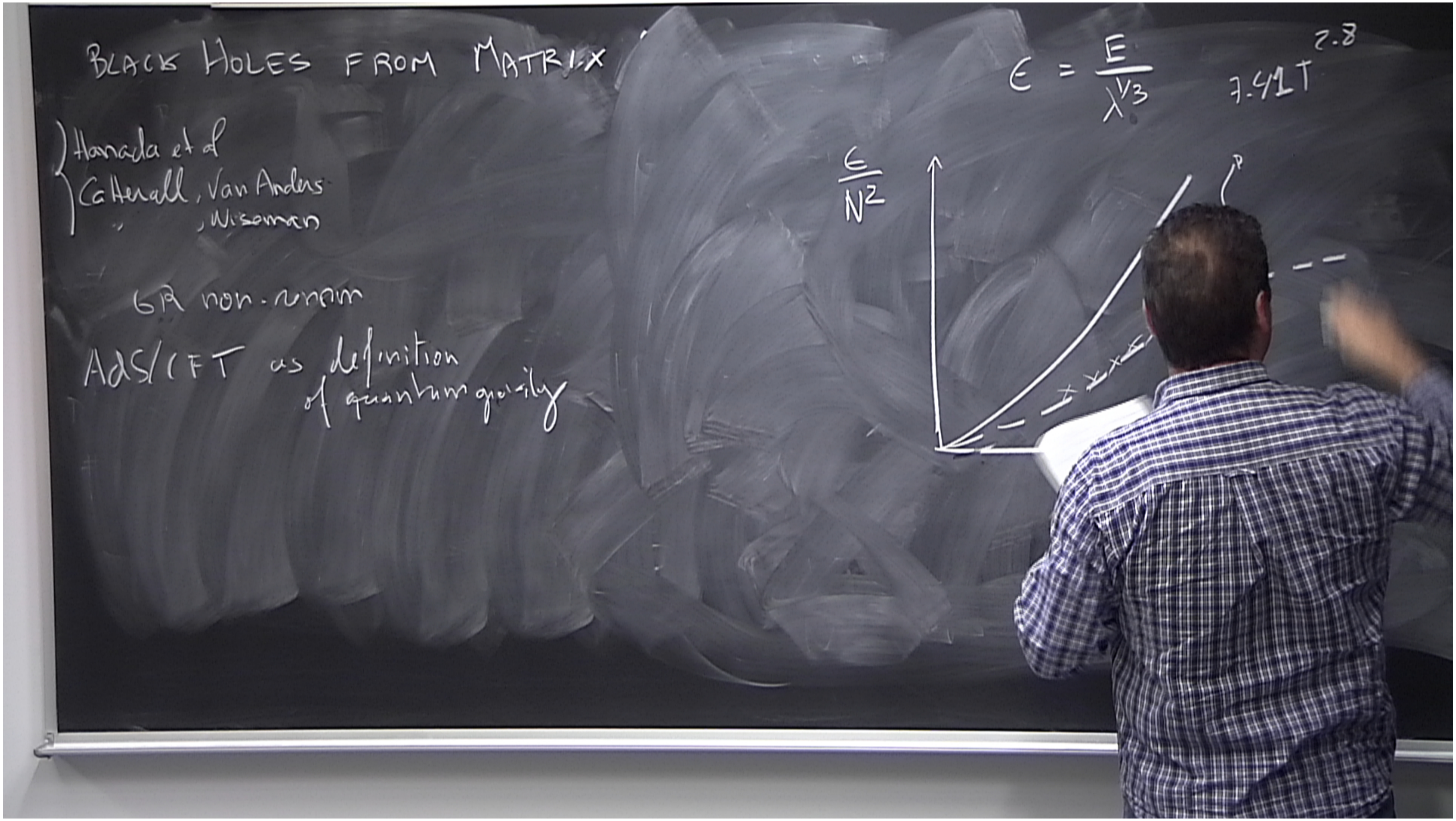
U(N)
Strings geometry
Gravity ↔ string coupling
N → ∞ classical gravity


adjoint U(N)
temperature T


A_-, X^i, ψ_α adjoint $U(N)$
temperature T
$S = \frac{N}{\lambda}\int_0^\beta dt\, \mathrm{tr}\Big(\frac{1}{2}(DX_i)^2 - \frac{1}{4}[X_i, X_j]^2 + \frac{1}{2}\psi D_t \psi + - \frac{1}{2}\psi_\alpha \gamma^i_{\alpha\beta}[X_i, \psi_\beta] \Big)$
$\lambda = \text{mass}^3$ relevant
Dimensionless $t = \frac{T}{\lambda^{1/3}}$ strong coupling ($T \to 0$)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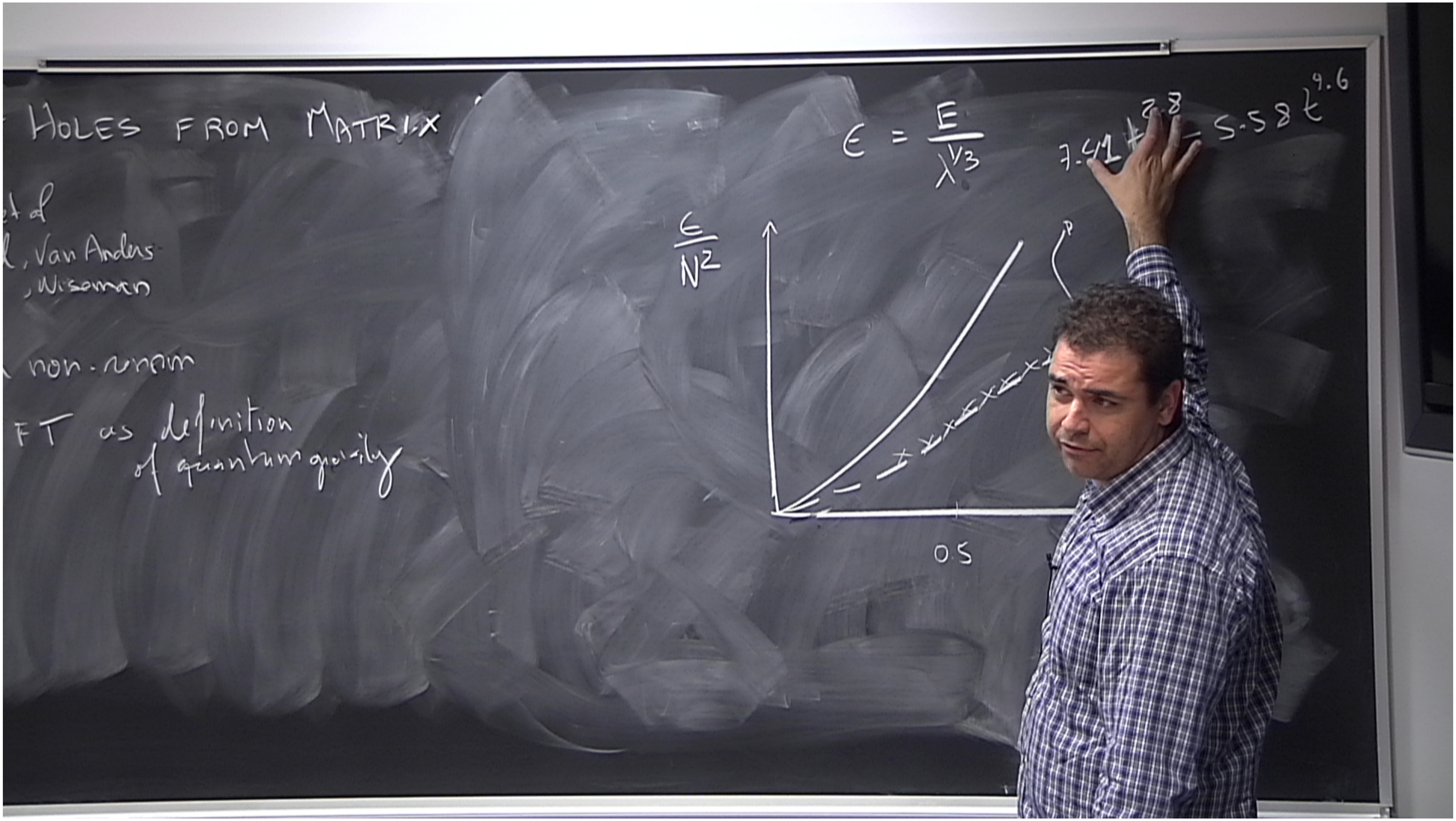
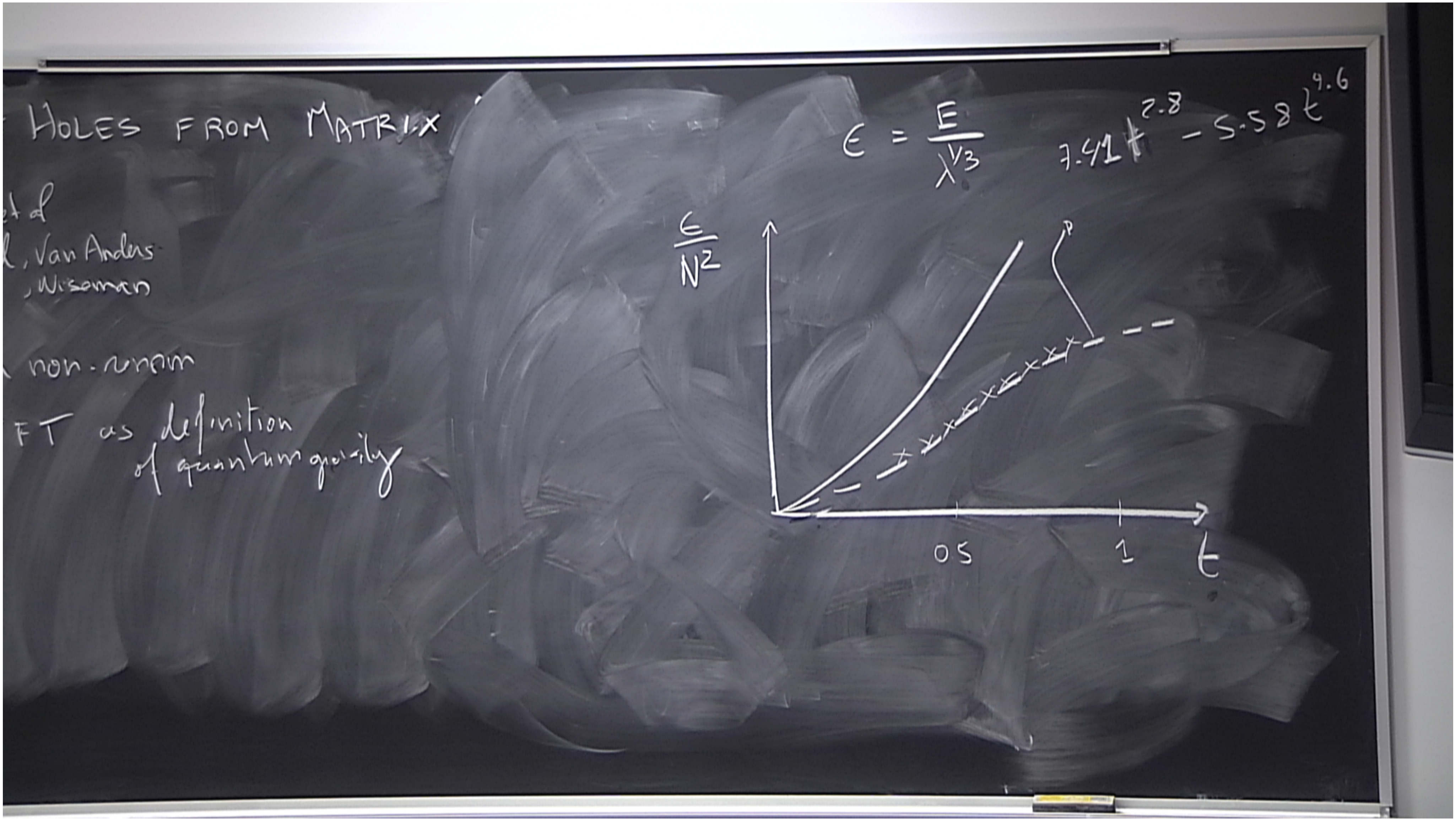
ε = E/λ^{1/3}
7.41 T^{2.8}
ε/N^2


HOLES FROM MATRIX
, Van Anders
, Wiseman
non - norm
FT as definition of quantum gravity
$\epsilon = \frac{E}{\lambda^{1/3}}$
$\frac{\epsilon}{N^2}$
$5.58\, t^{9.6}$
0.5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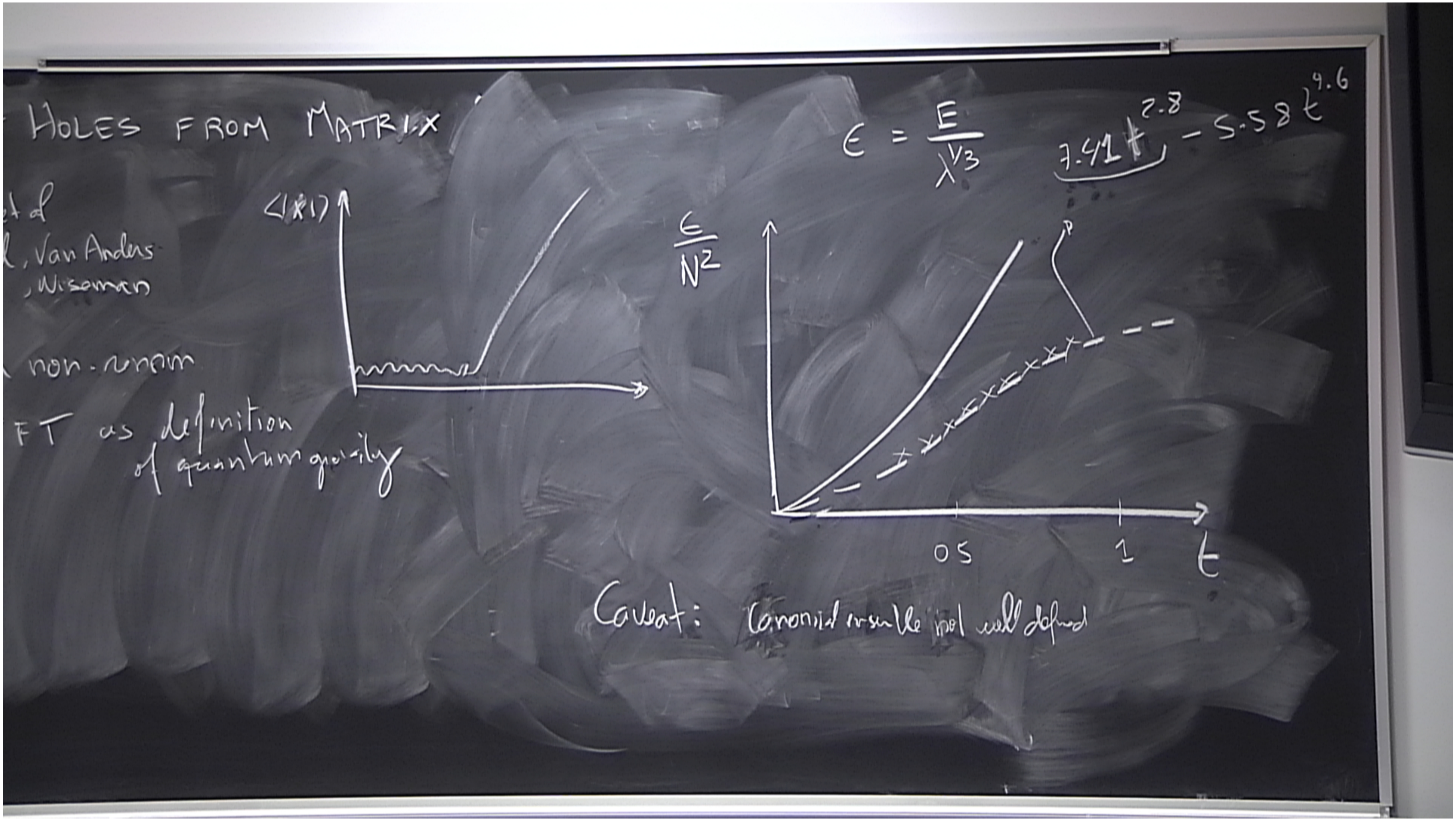
FT as definition of quantum gravity
$\epsilon = \frac{E}{\lambda^{1/3}}$
$7.41 t^{2.8} - 5.58 t^{4.6}$
$\frac{\epsilon}{N^2}$
0.5
1
t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FT as definition
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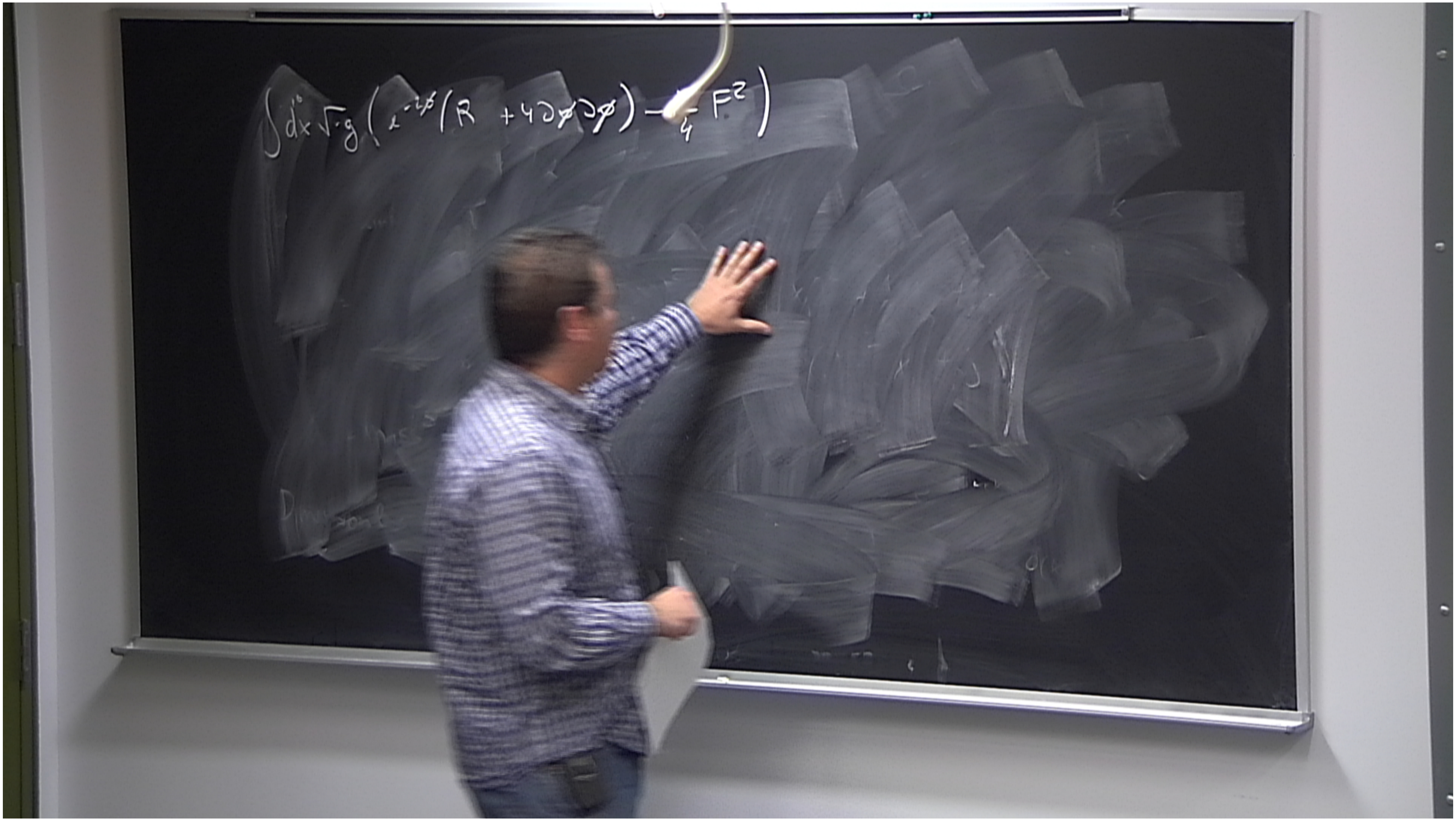
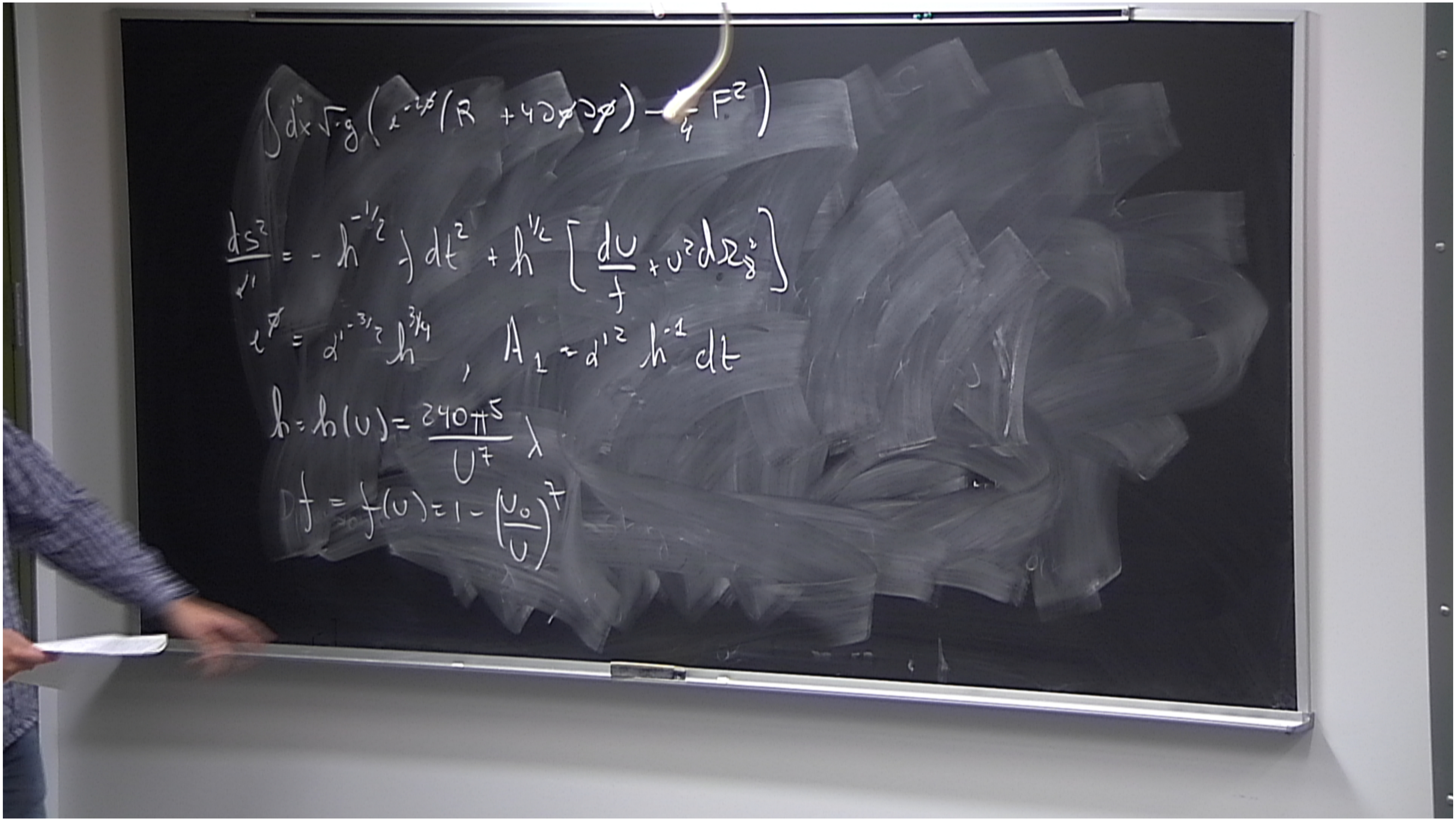
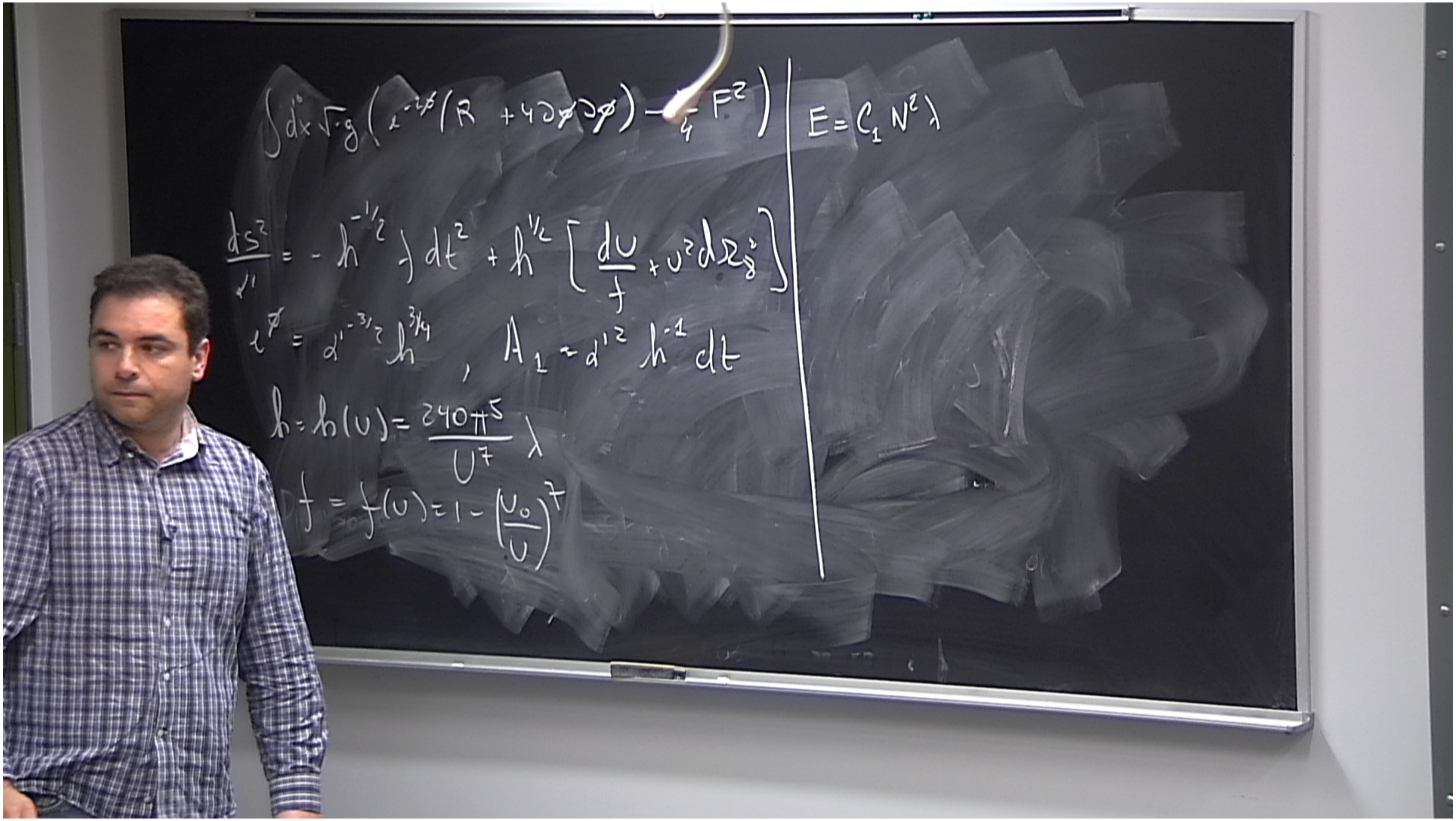
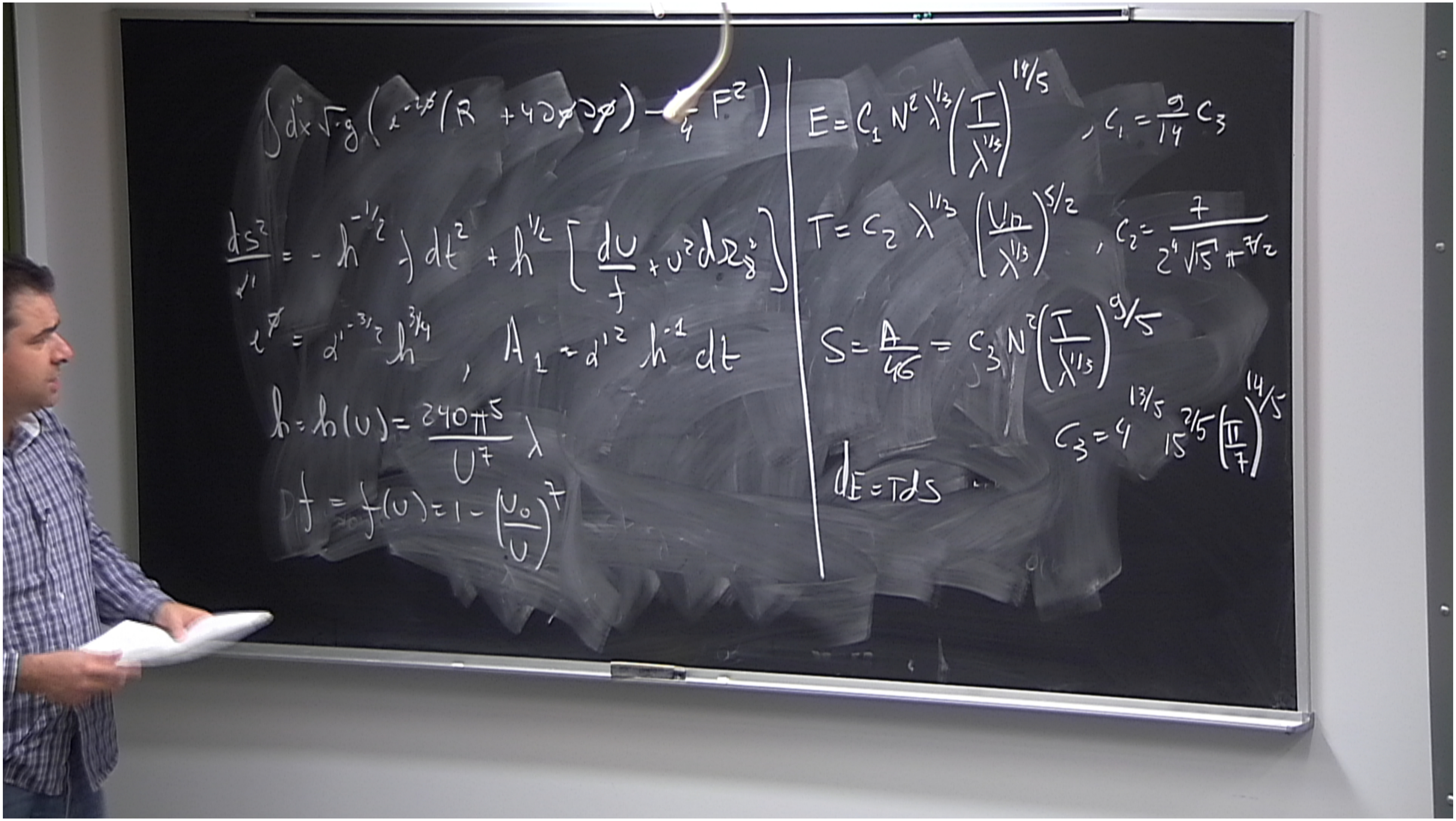
$\langle |X| \rangle$
$\epsilon = \frac{E}{\lambda^{1/3}}$
$7.41 t^{2.8} - 5.58 t^{4.6}$
$\frac{\epsilon}{N^2}$
0.5
1
t
Caveat:

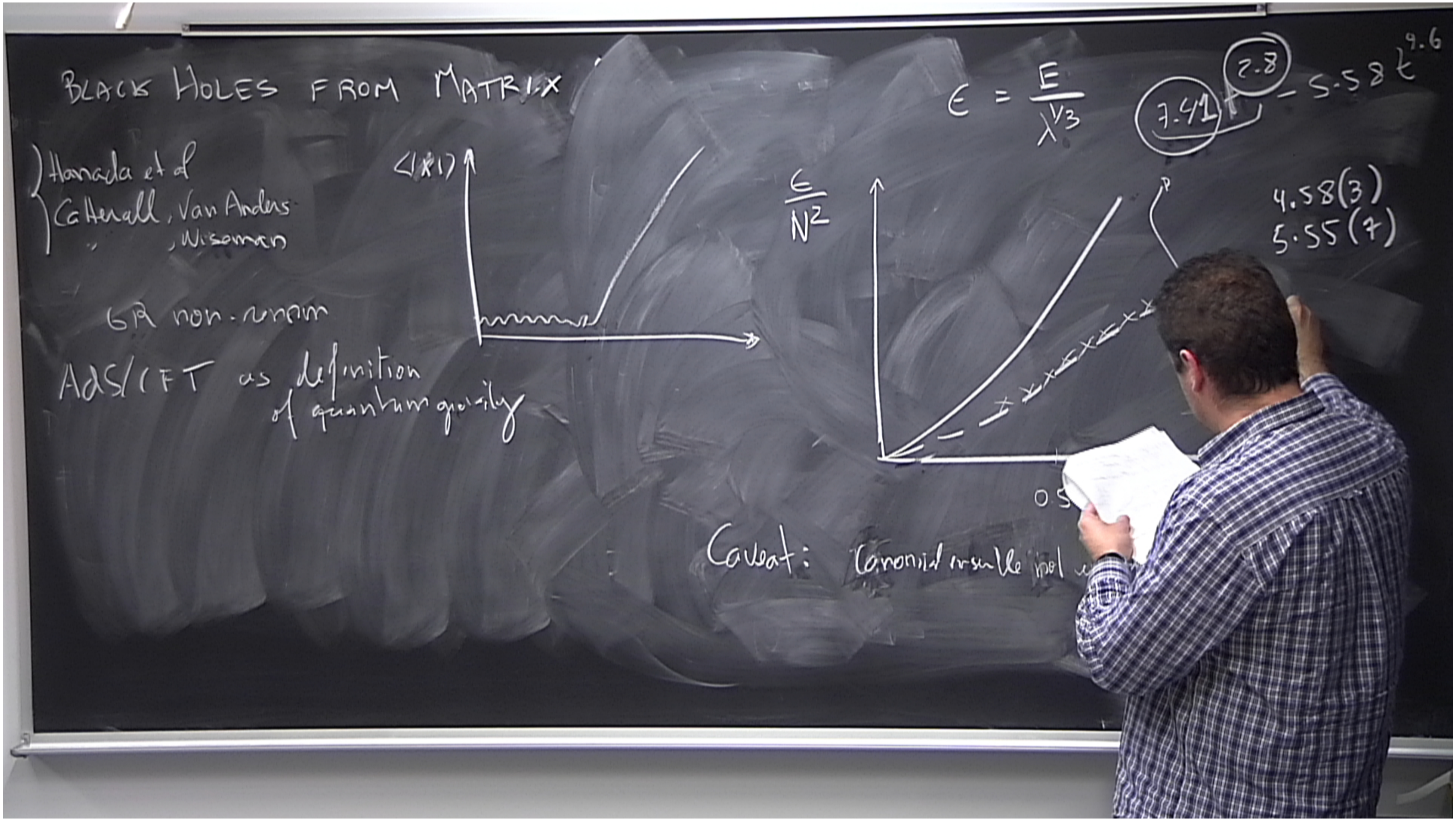


∫d¹⁰x √-g (e^{-2φ} (R + 4∂φ∂φ) - 1/4 F²)


∫d^10x √-g (e^-2φ (R + 4∂φ∂φ) - 1/4 F^2)
ds^2/α' = - h^-1/2 f dt^2 + h^1/2 [du/f + u^2 dΩ_8^2]
e^φ = α'^-3/2 h^3/4 , A_1 = α'^2 h^-1 dt
h = h(U) = 240π^5/U^7 λ
f = f(U) = 1 - (U_0/U)^7


E = C1 N2 λ


E = C1 N2 λ1/3 (T/λ1/3)14/5 , C1 = 9/14 C3
T = C2 λ1/3 (U0/λ1/3)5/2 , C2 = 7/(24 √15 π-7/2)
S = A/4G = C3 N2 (T/λ1/3)9/5
C3 = 413/5 152/5 (π/7)14/5
dE = TdS
h = h(U) = 240π5/U7 λ
f = f(U) = 1 - (U0/U)7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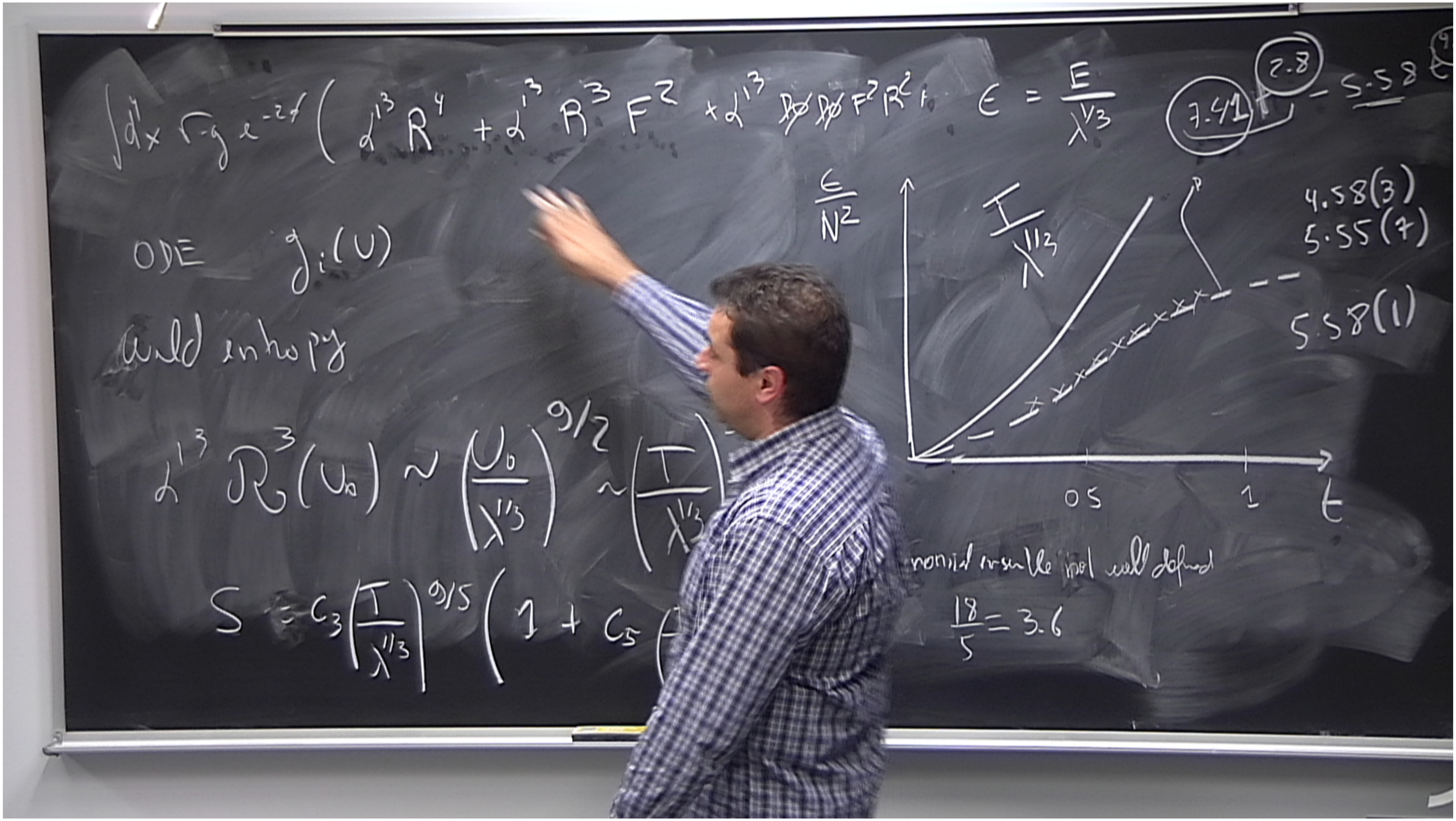
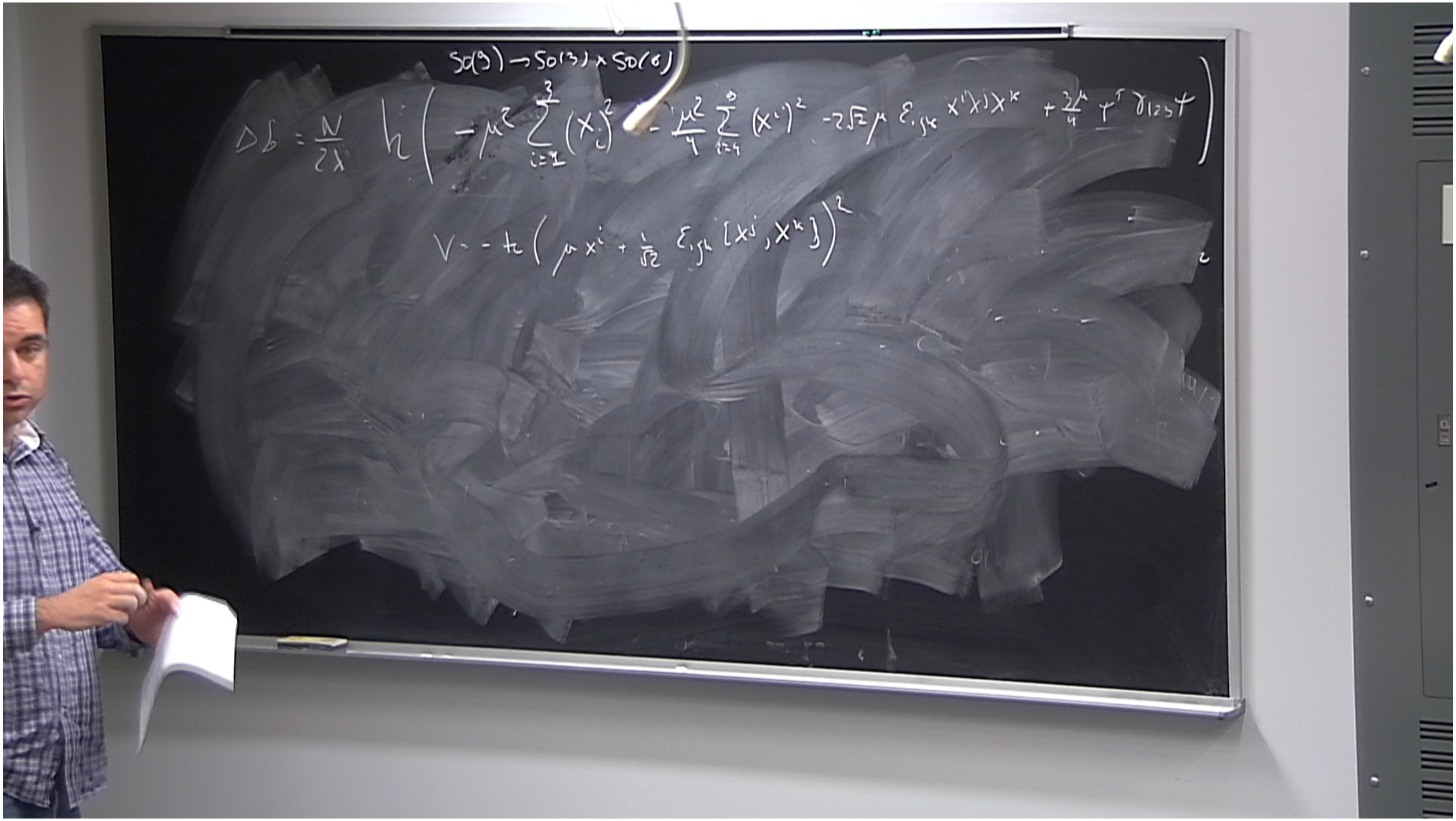
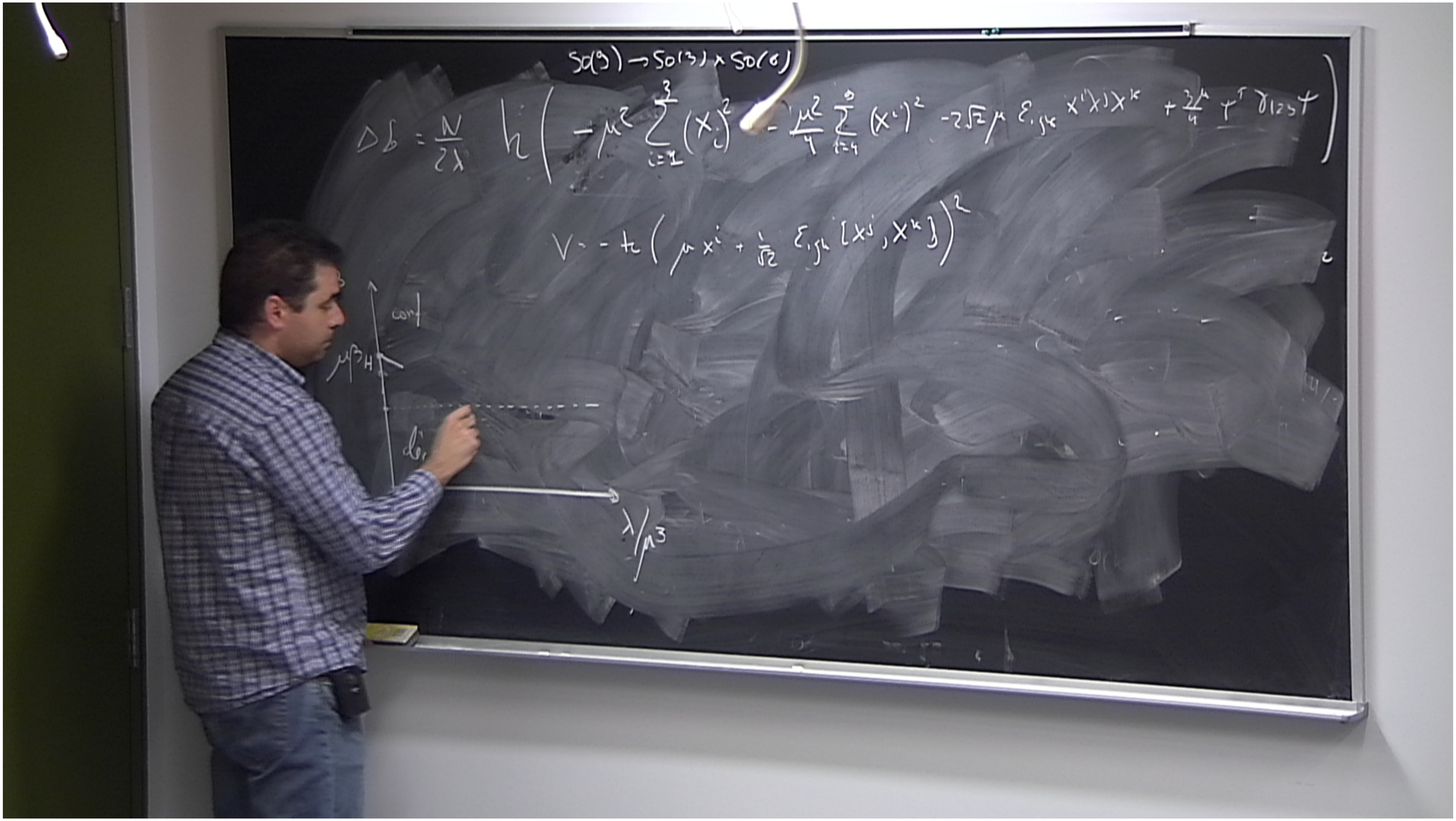
$\epsilon = \frac{E}{\lambda^{1/3}}$
$\frac{\epsilon}{N^2}$
7.41
2.8
$-5.58\,t^{9.6}$
4.58(3)
5.55(7)
Caveat:

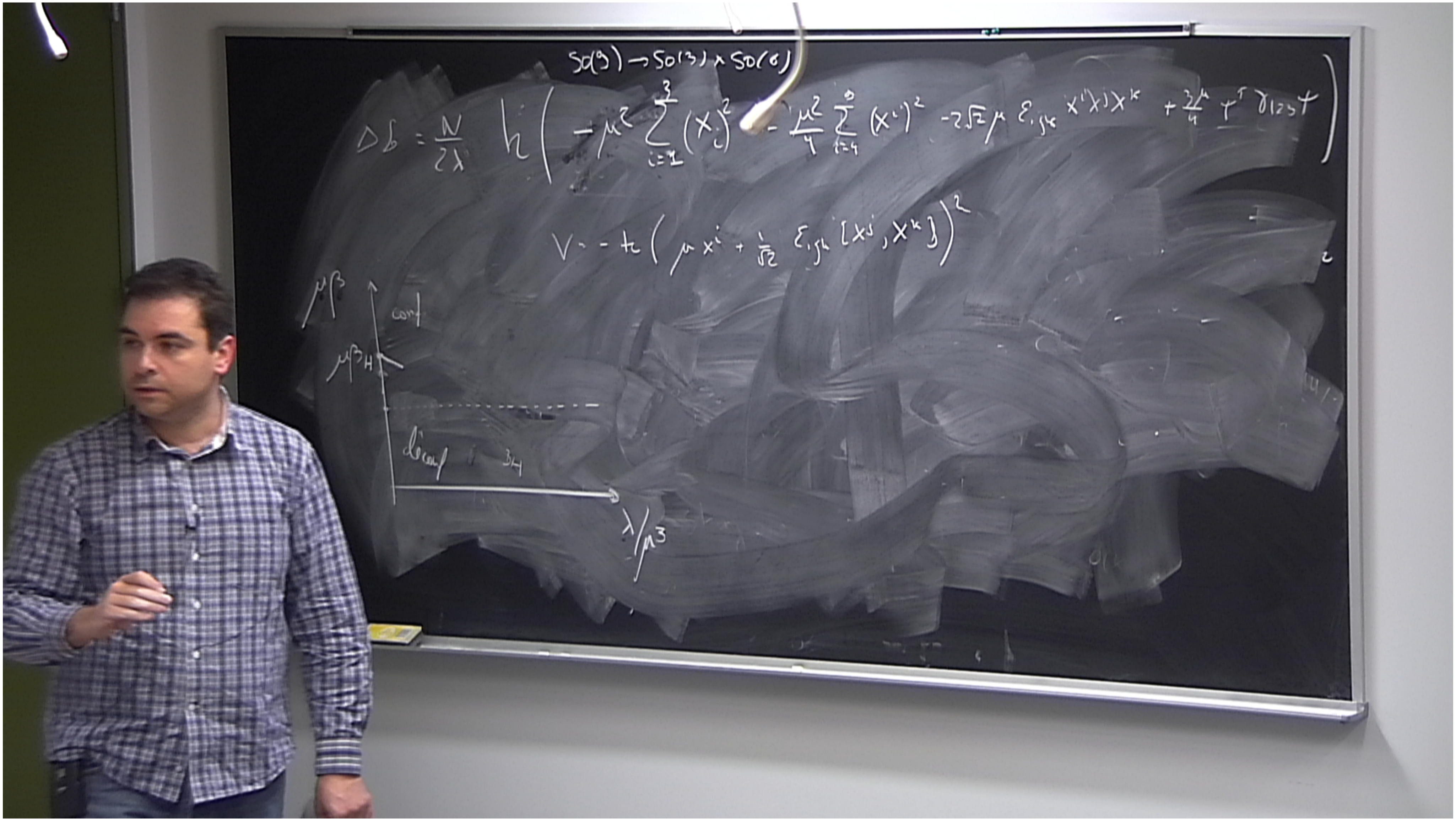

7.41
2.8
4.58(3
5.55(
5.58(
05
1
t
Canonical results not well defined

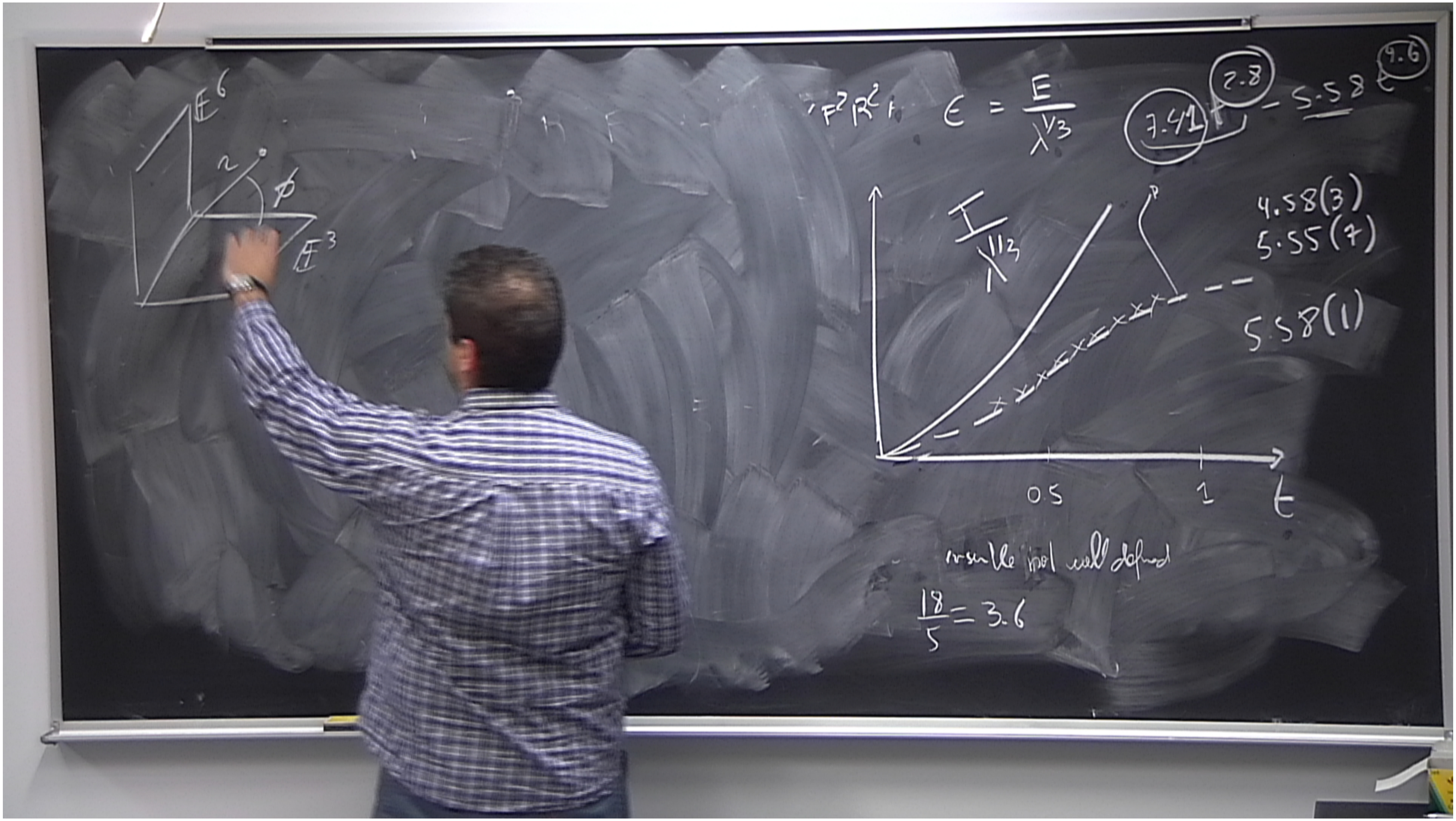

ODE
wald entropy
0.5
1
18/5 = 3.6
4.58(3)
5.55(7)
5.58(1)
7.41
2.8
5.58

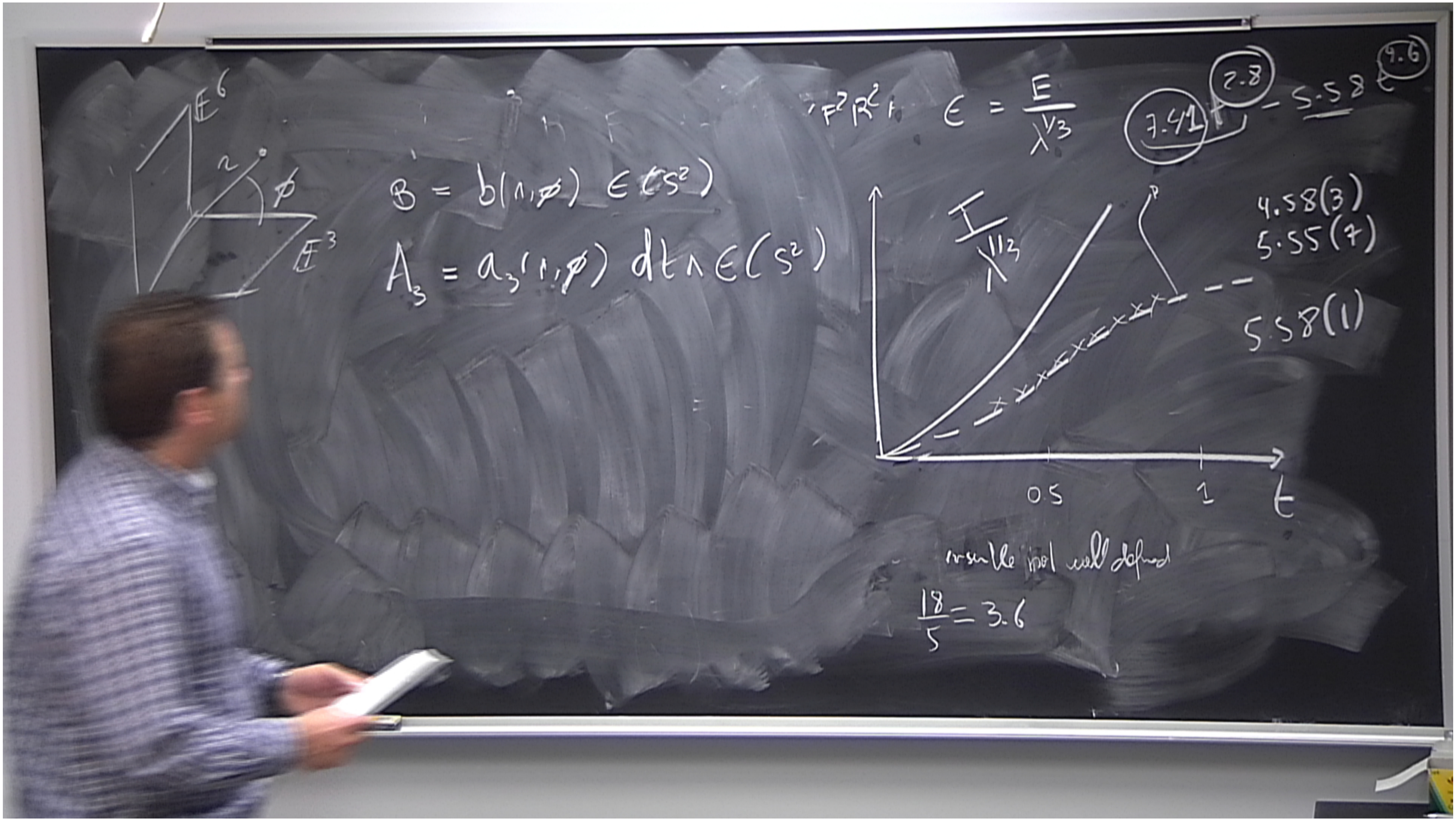

SO(9) → SO(3) × SO(6)



SO(9) → SO(3) × SO(6)


SO(9) → SO(3) × SO(6)
conf
decouf
λ/μ³


$\epsilon = \frac{E}{\lambda^{1/3}}$
7.41
2.8
5.58
9.6
4.58(3)
5.55(7)
5.58(1)
0.5
1
t
results not well defined
$\frac{18}{5} = 3.6$



$\mathbb{E}^6$
$\mathbb{E}^3$
$B = b(r,\phi)\ \epsilon(S^2)$
$A_3 = a_3(r,\phi)\ dt \wedge \epsilon(S^2)$
$\epsilon = \frac{E}{\lambda^{1/3}}$
$\frac{I}{\lambda^{1/3}}$
7.41
2.8
5.58
9.6
4.58(3)
5.55(7)
5.58(1)
0.5
1
t
$\frac{18}{5} = 3.6$