Title: Holomorphic surfaces from determinants

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Series: Mathematical Physics

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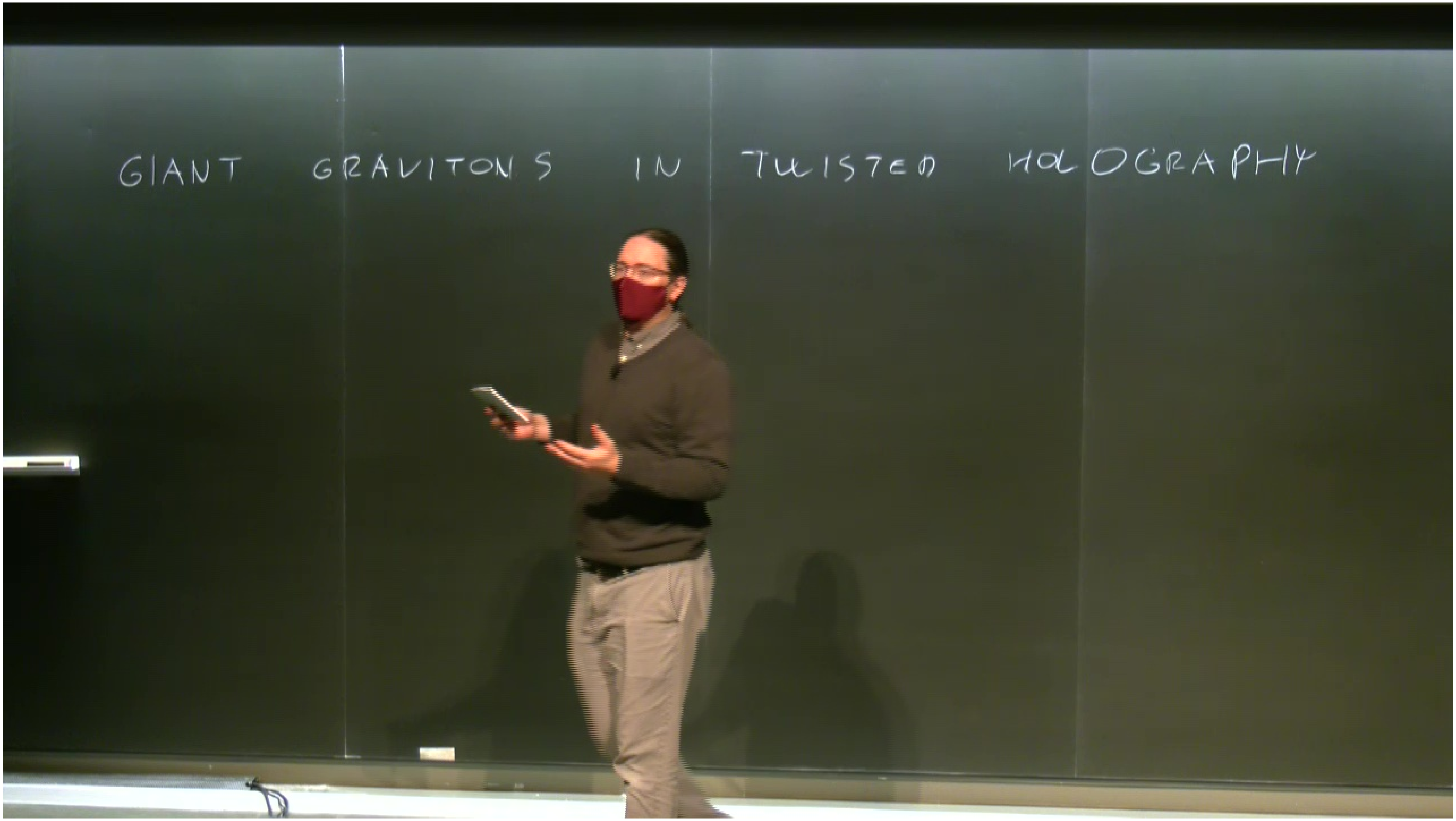
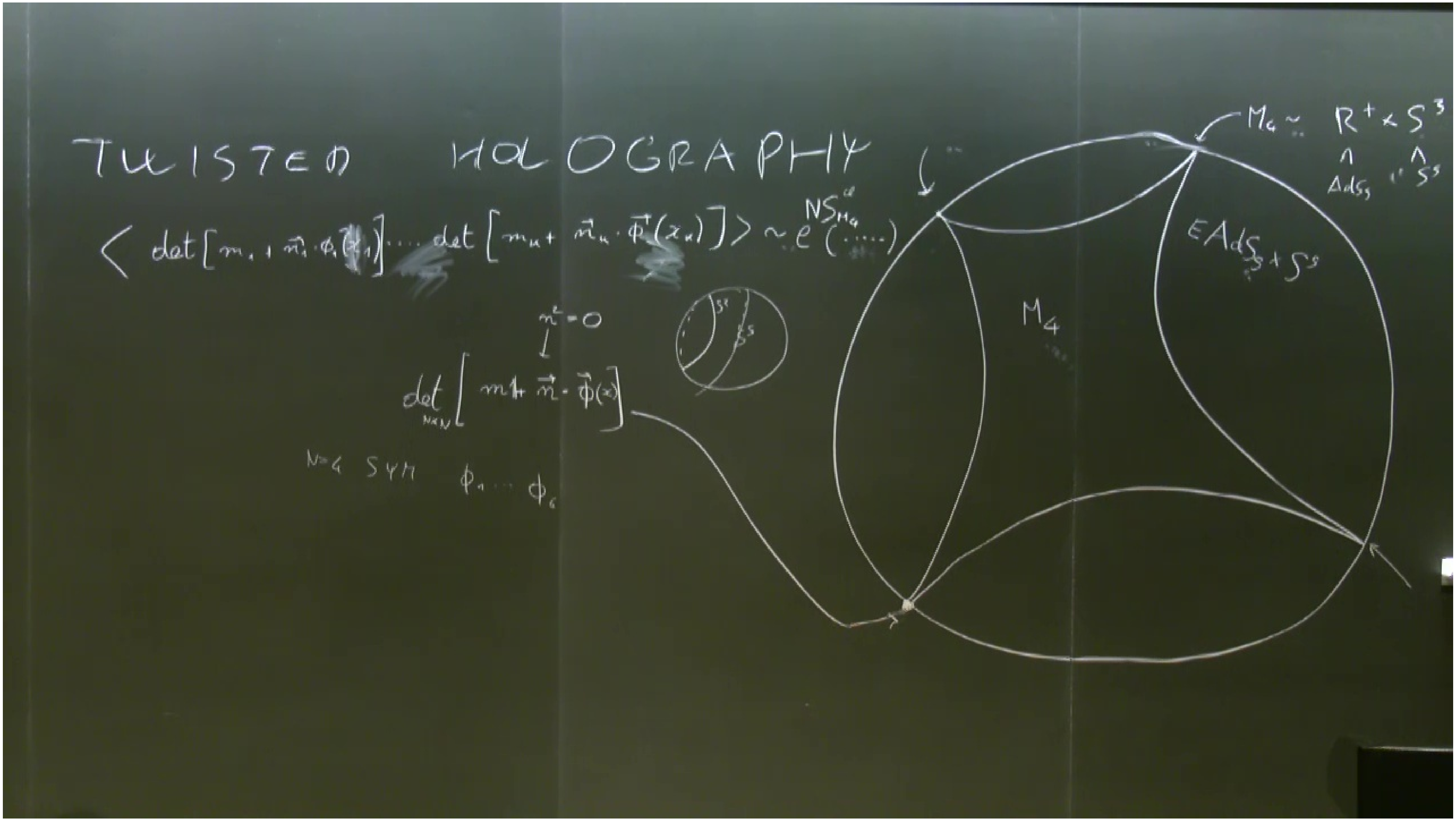
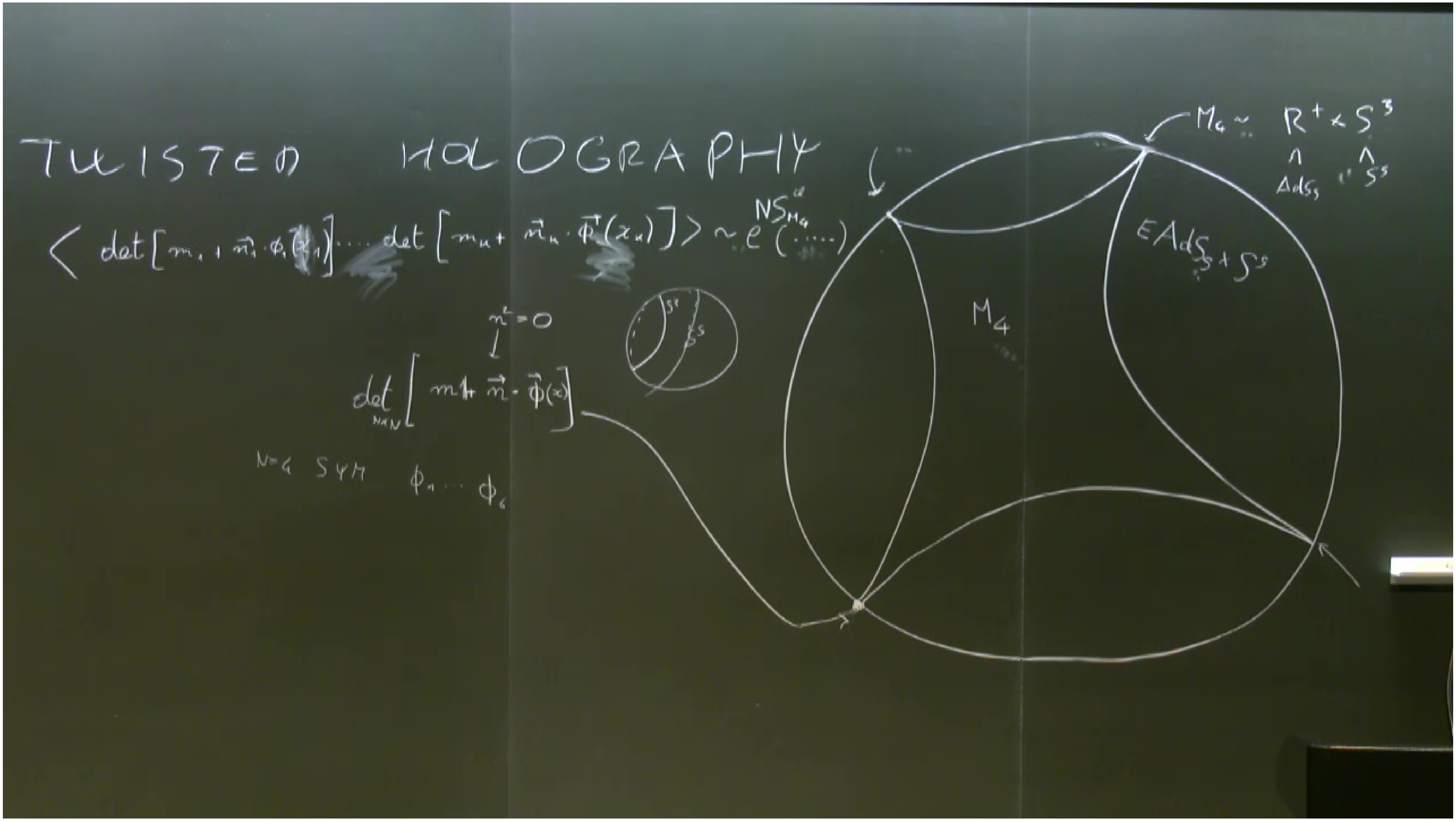
Abstract: I will describe a concrete, computable example of holographic geometry emerging purely from the combinatorics of large matrices. Correlation functions of determinant operators in a matrix-valued free chiral algebra will be matched to holomorphic curves in SL(2,C).

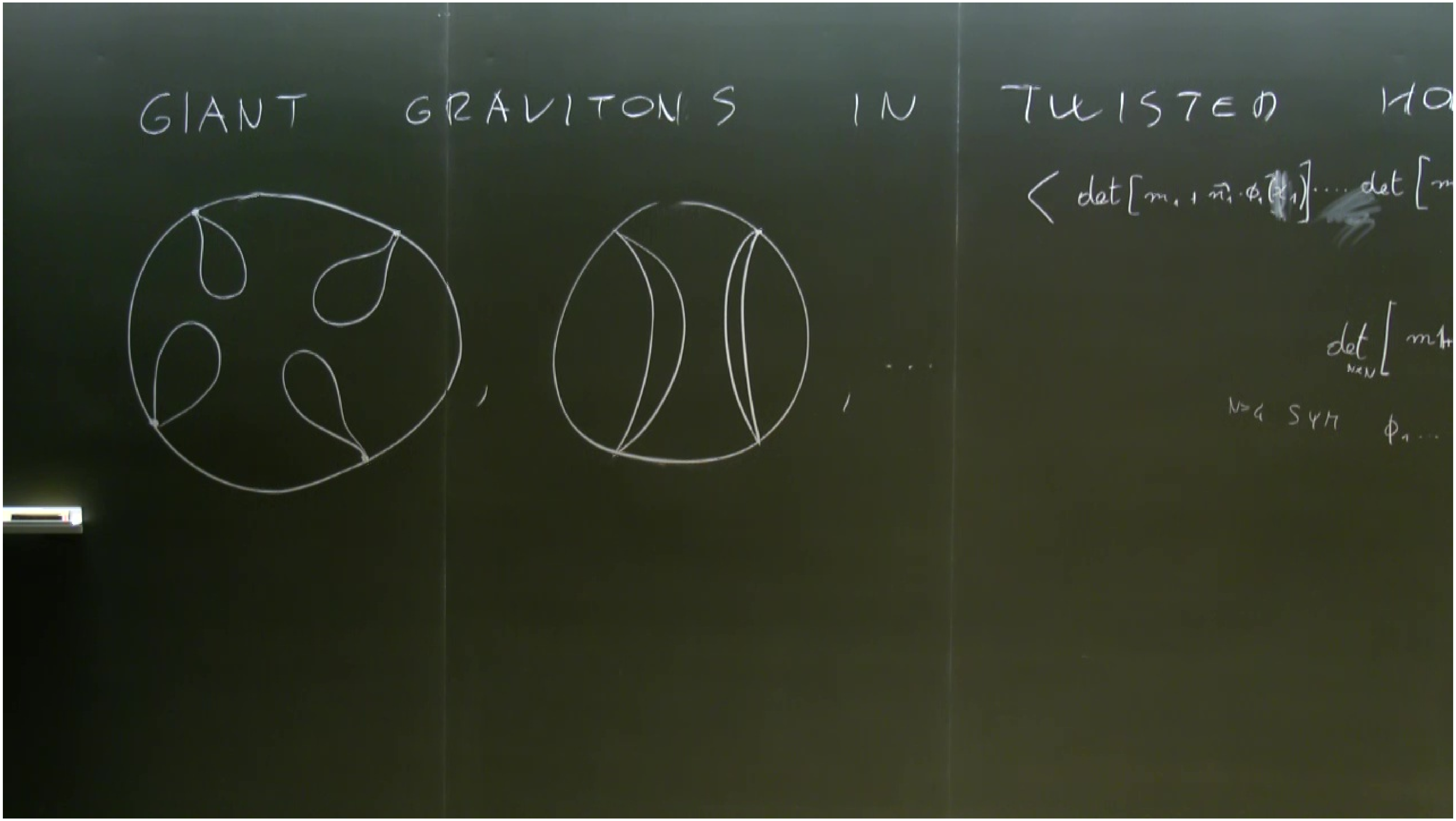
Zoom Link: https://pitp.zoom.us/j/99341570607?pwd=TVVmSkF3d1haa0hBOWlPeDhGNi9aQT09

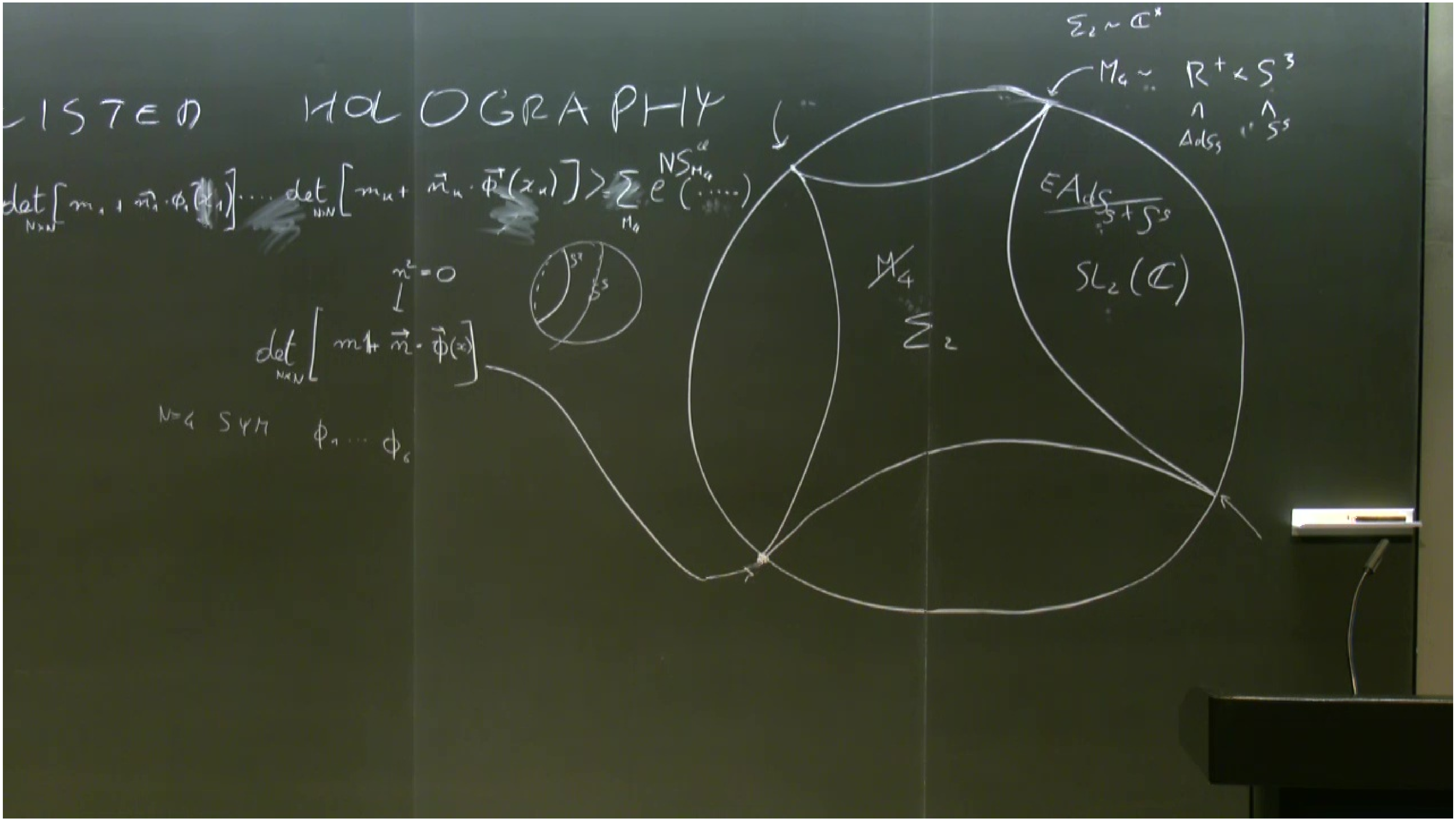

GIANT GRAVITONS IN TWISTED HOLOGRAPHY

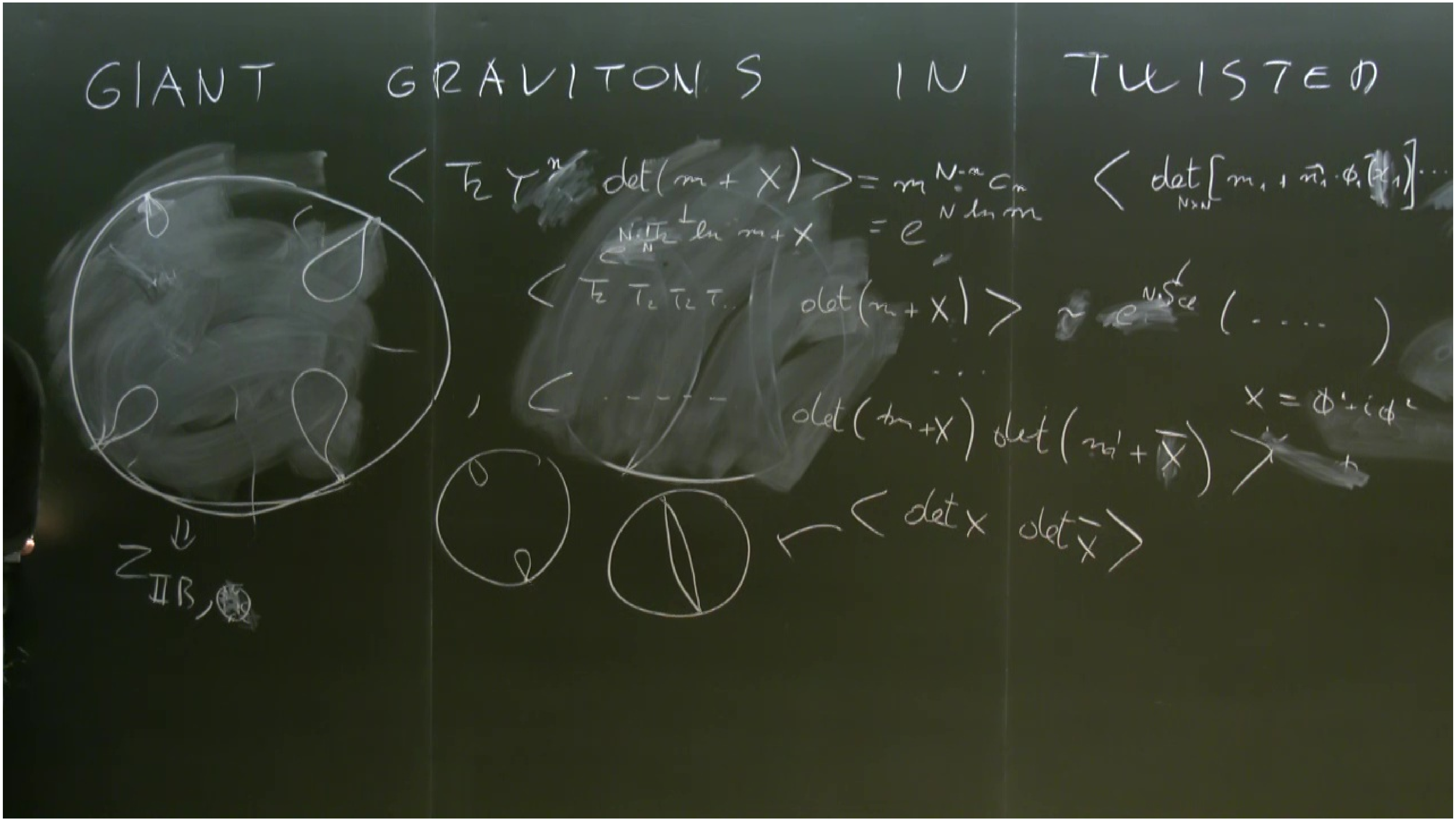

TWISTED HOLOGRAPHY
< det[m_1 + n_1 · φ(x_1)] ... det[m_k + n_k · φ(x_k)] > ~ e^{N S_{M_4}} (.....)
n² = 0
det_{N×N} [m 1 + n · φ(x)]
N=4 SYM φ_1 ... φ_6
M_4 ~ R^+ × S^3
AdS_5 S^5
EAdS_5 × S^5
M_4

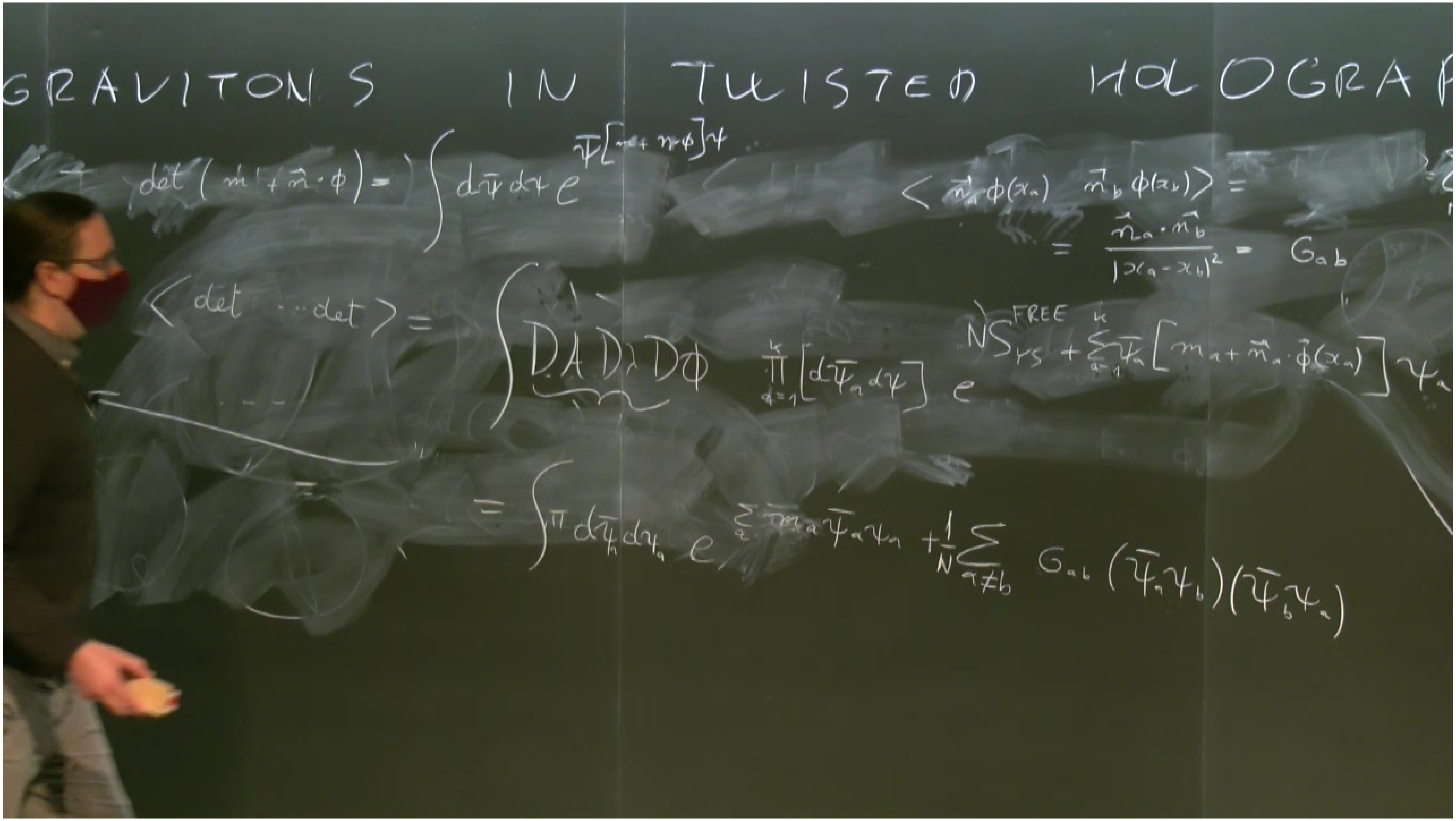


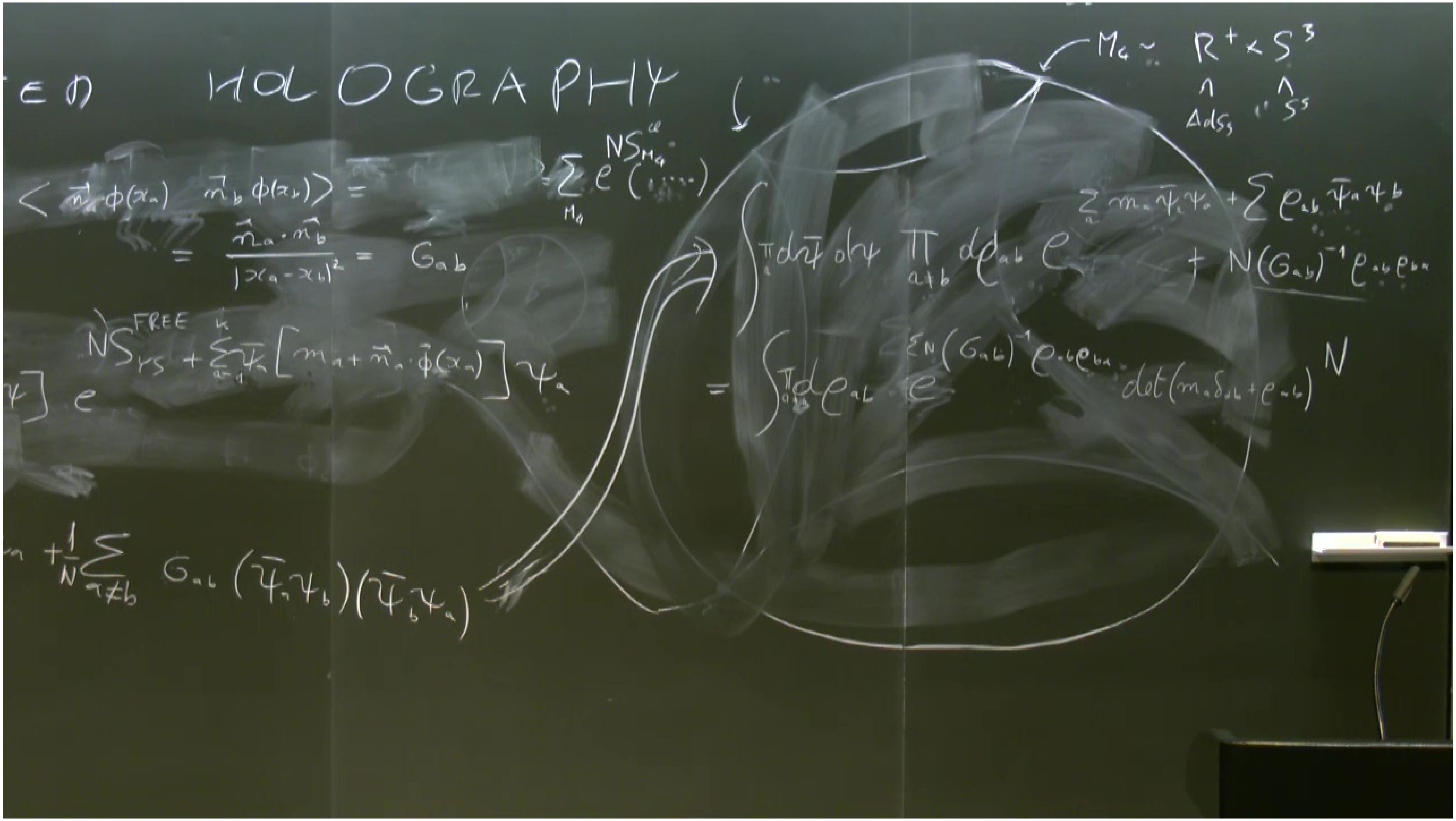
TWISTED HOLOGRAPHY
M4 ~ R+ × S3
AdS5
S5
EAdS5 × S5
M4
n² = 0
det
N×N
N=4 SYM

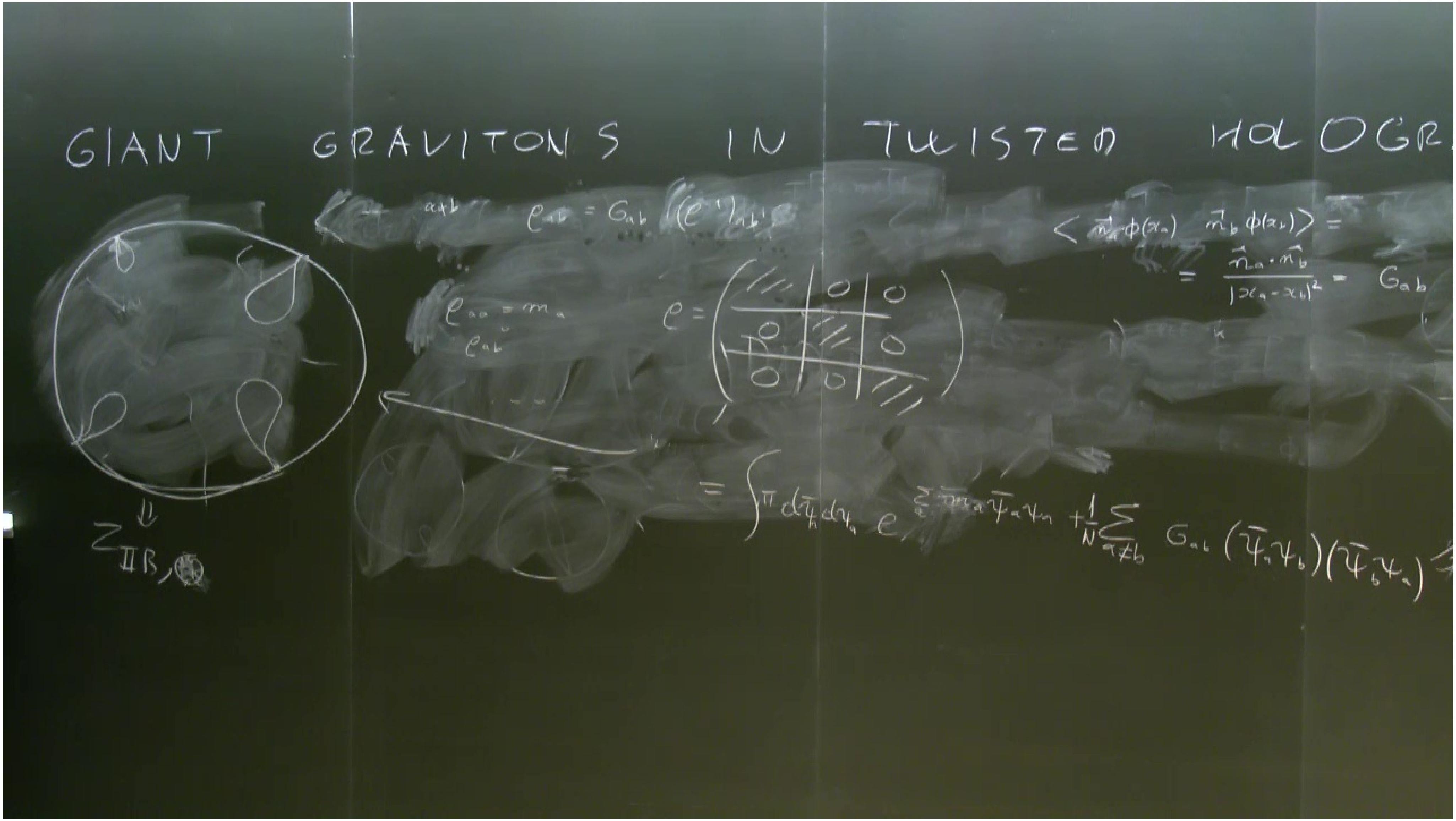

GIANT GRAVITONS IN TWISTED
det
N=4 SYM

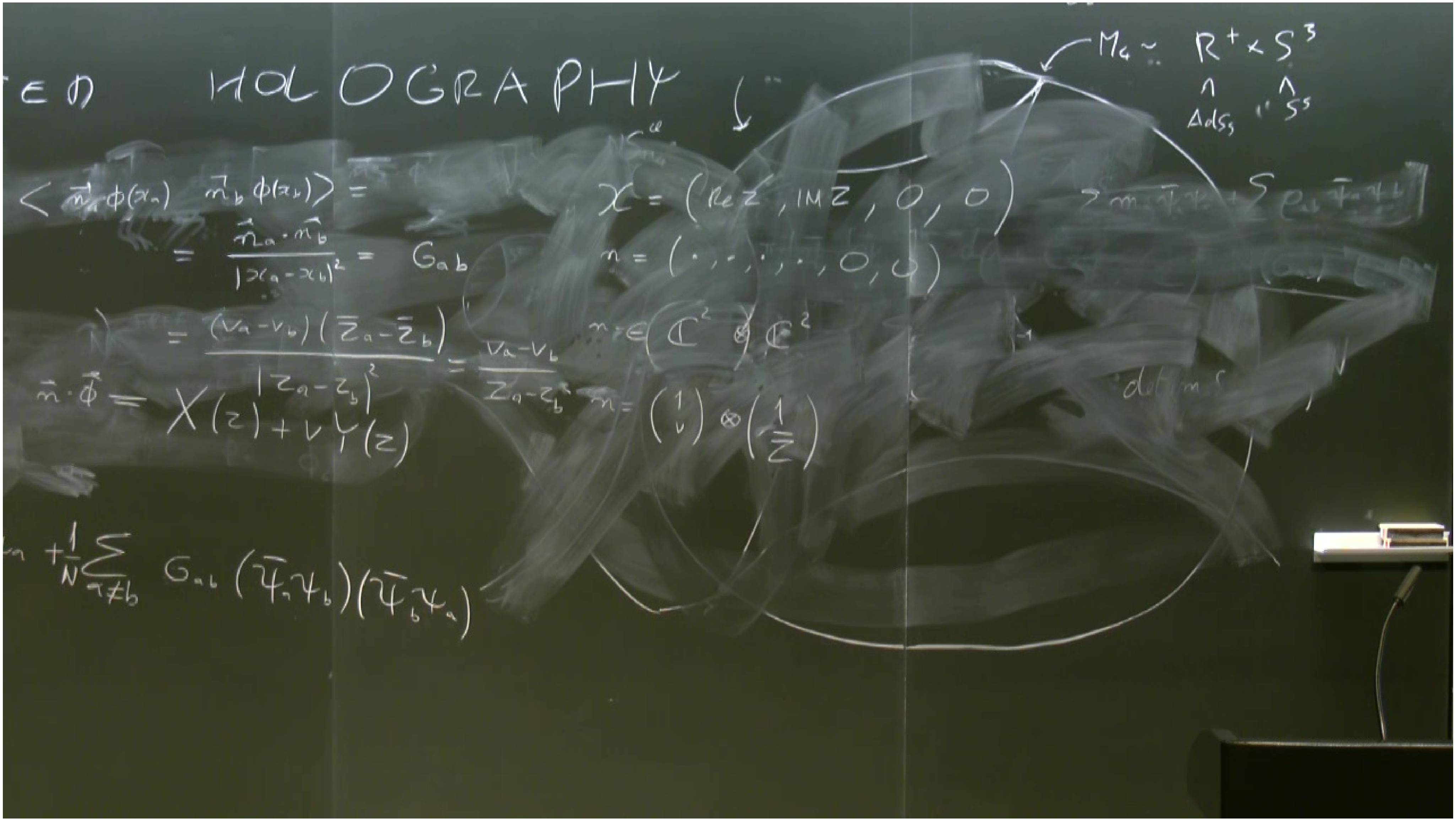

ISTED HOLOGRAPHY
N=4 SYM
EAdS
SL2(C)

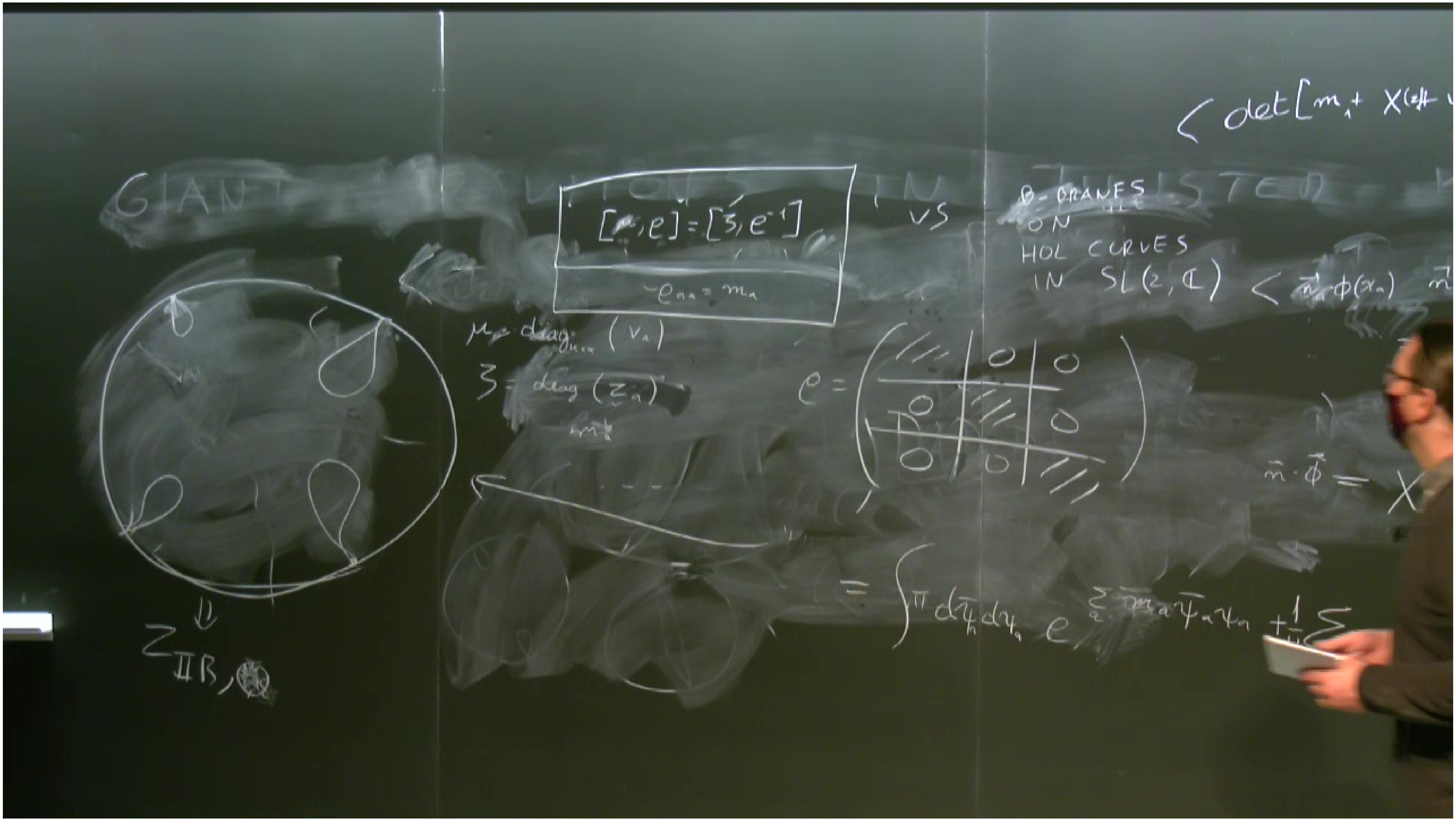

GIANT GRAVITONS IN TWISTED
det(m + X)
olet(m + X)
X = Φ¹ + iΦ²
det X det X̄


GRAVITONS IN TWISTED HOLOGRAP
det(m + n·φ) = ∫ dψ̄ dψ e^{ψ̄[m + n·φ]ψ}
⟨ n_a φ(x_a) n_b φ(x_b) ⟩ = n_a · n_b / |x_a − x_b|^2 = G_ab
⟨ det … det ⟩ = ∫ DA Dλ Dφ ∏_{a=1}^{k} [dψ̄_a dψ] e^{N S_YS^FREE + Σ_{a=1}^{k} ψ̄_a [m_a + n_a · φ(x_a)] ψ_a}
= ∫ ∏ dψ̄_a dψ_a e^{Σ_a m_a ψ̄_a ψ_a + (1/N) Σ_{a≠b} G_ab (ψ̄_a ψ_b)(ψ̄_b ψ_a)}

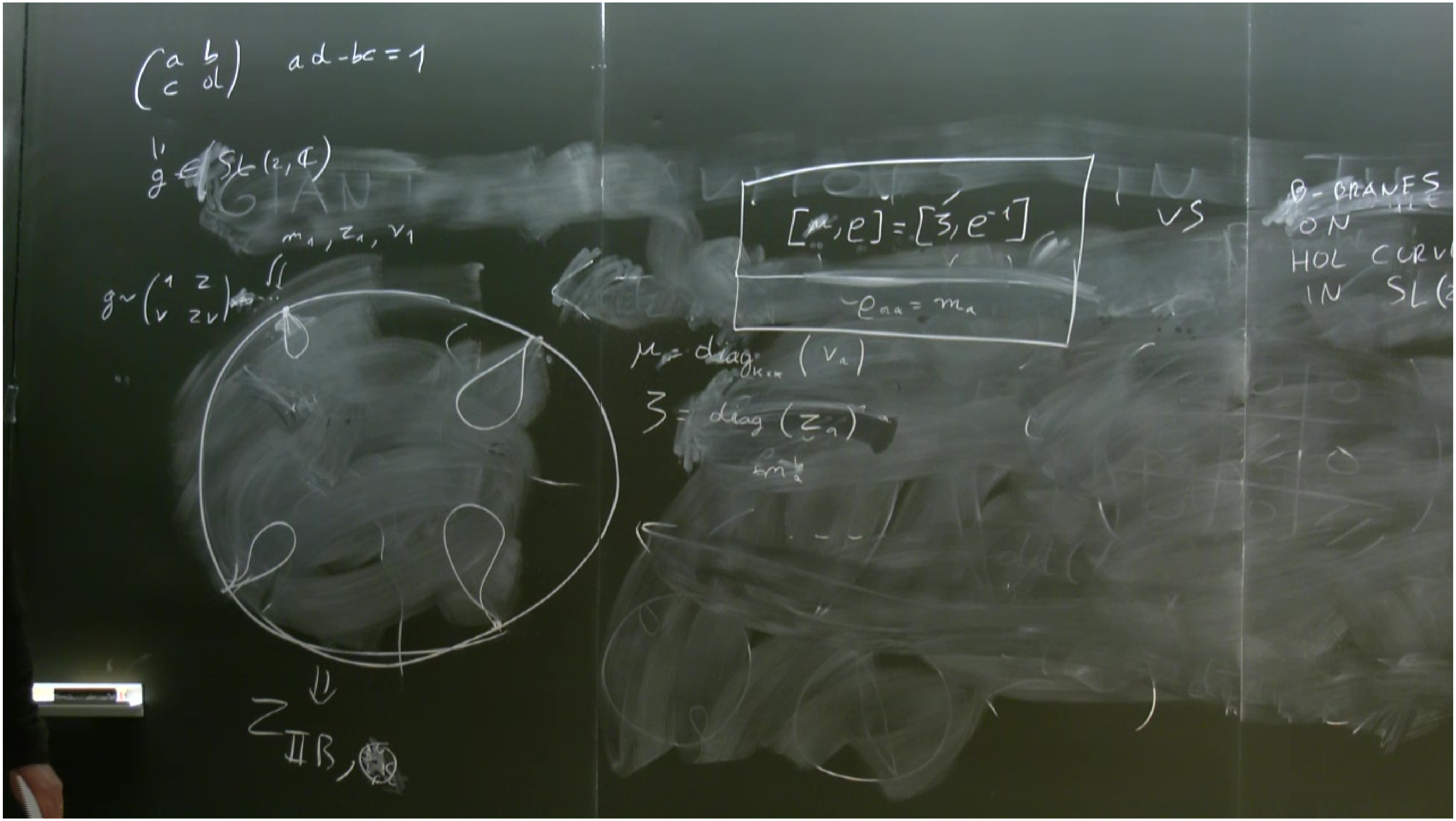

HOLOGRAPHY
M₄ ~ R⁺ × S³
AdS₅
S⁵
FREE
det(mₐδₐb + ρₐb)
N

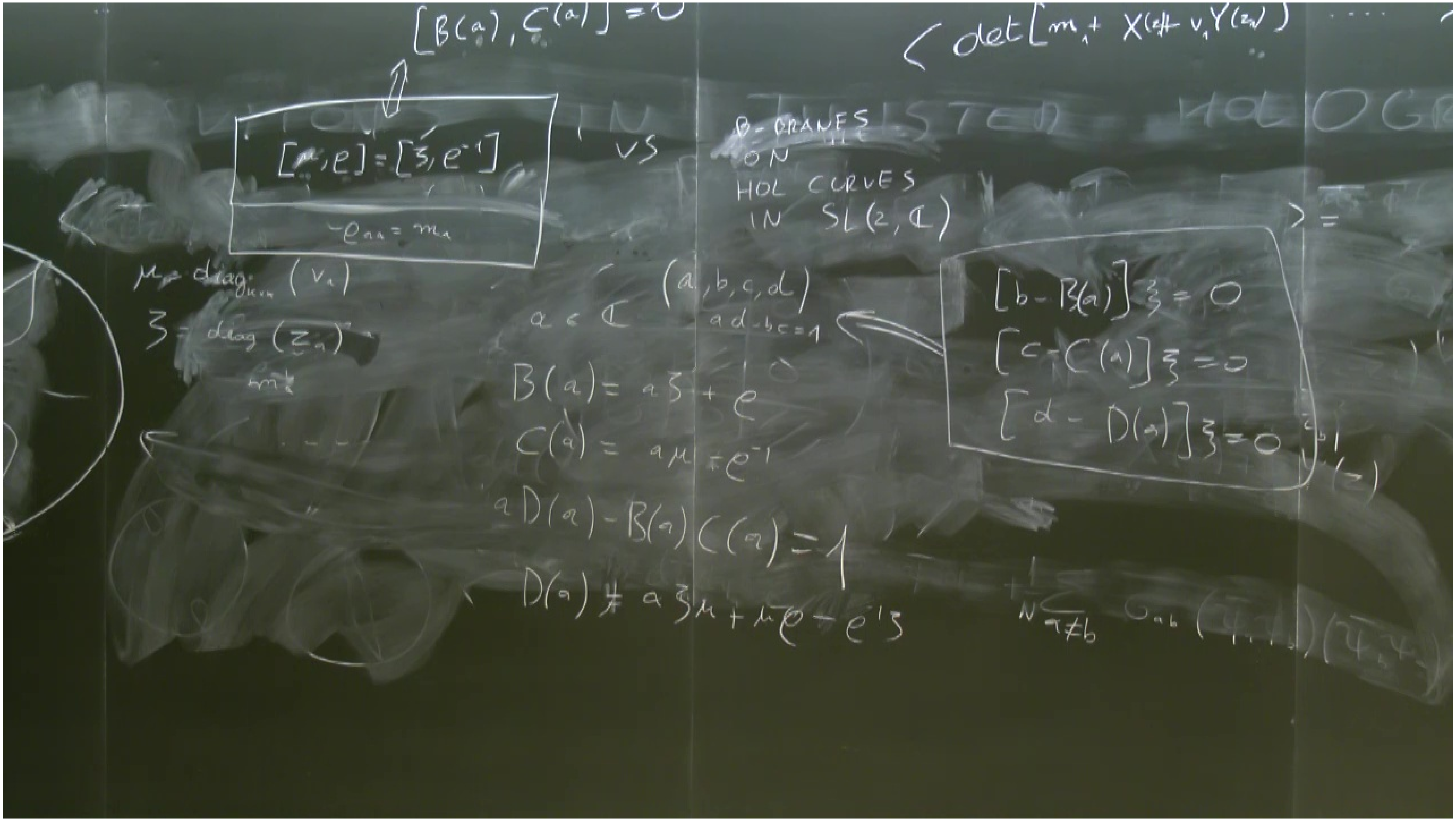

GIANT GRAVITONS IN TWISTED HOLOGR
$\rho_{ab} = G_{ab}$
$\rho_{aa} = m_a$
$\langle \vec{n}_a \phi(x_a) \ \vec{n}_b \phi(x_b) \rangle =$
$= \frac{\vec{n}_a \cdot \vec{n}_b}{|x_a - x_b|^2} = G_{ab}$
Z_{IIB}
$G_{ab} (\bar{\psi}_a \psi_b)(\bar{\psi}_b \psi_a)$

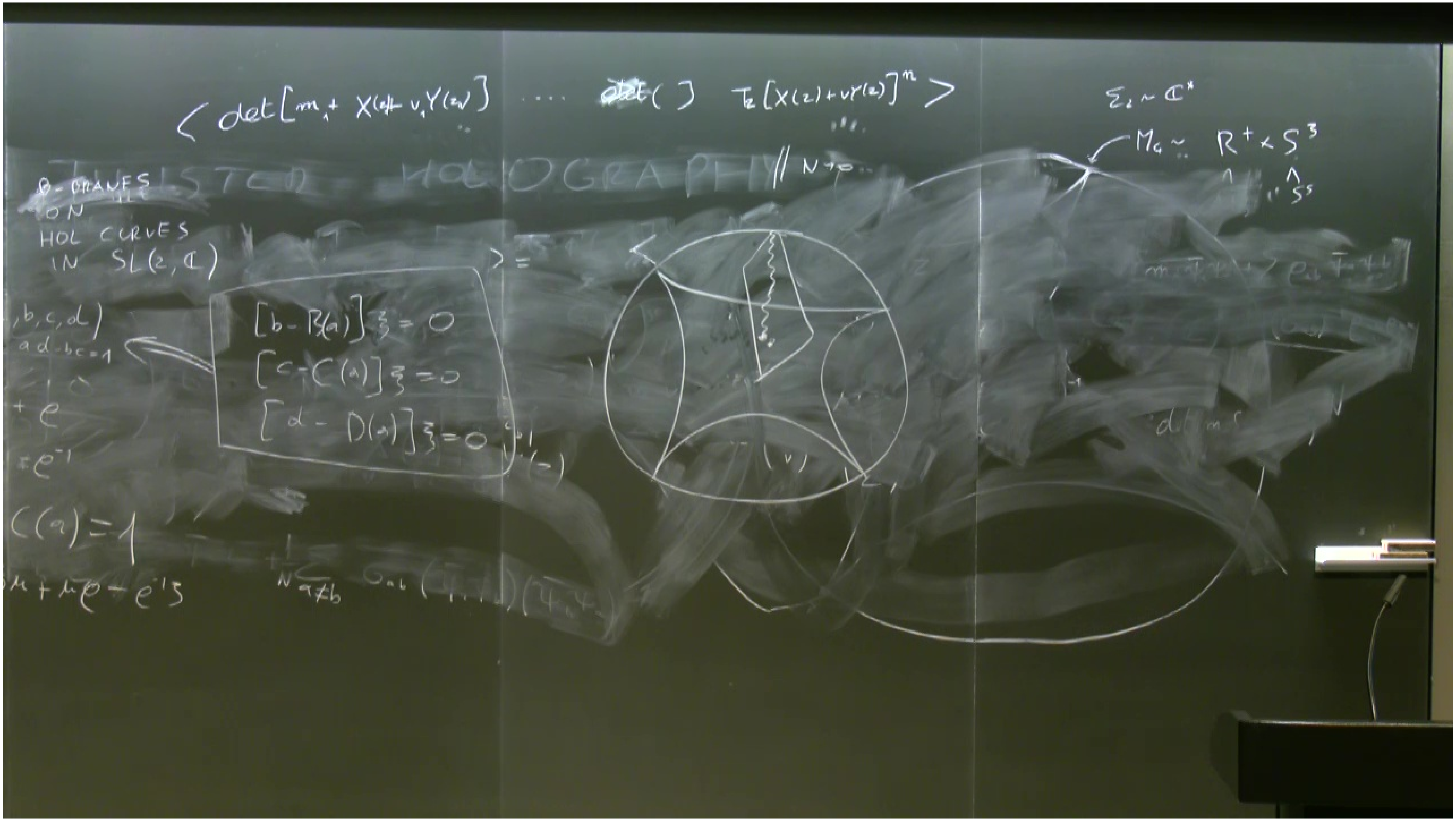

HOLOGRAPHY
M4 ~ R+ × S3
AdS5 S5
x = (Re z, Im z, 0, 0)
= Gab
n ∈ C2 ⊗ C2
X(z) + v Y(z)

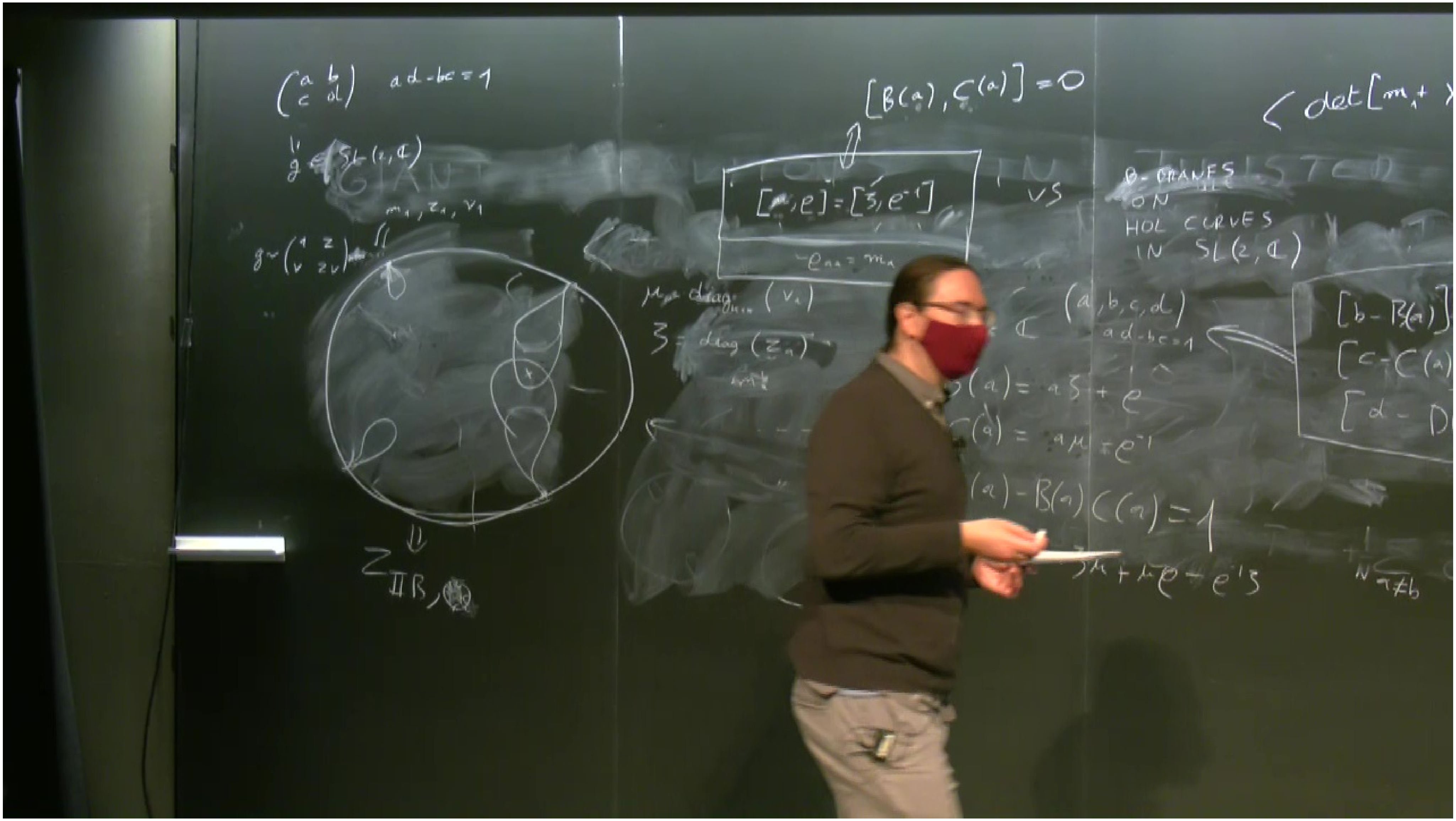


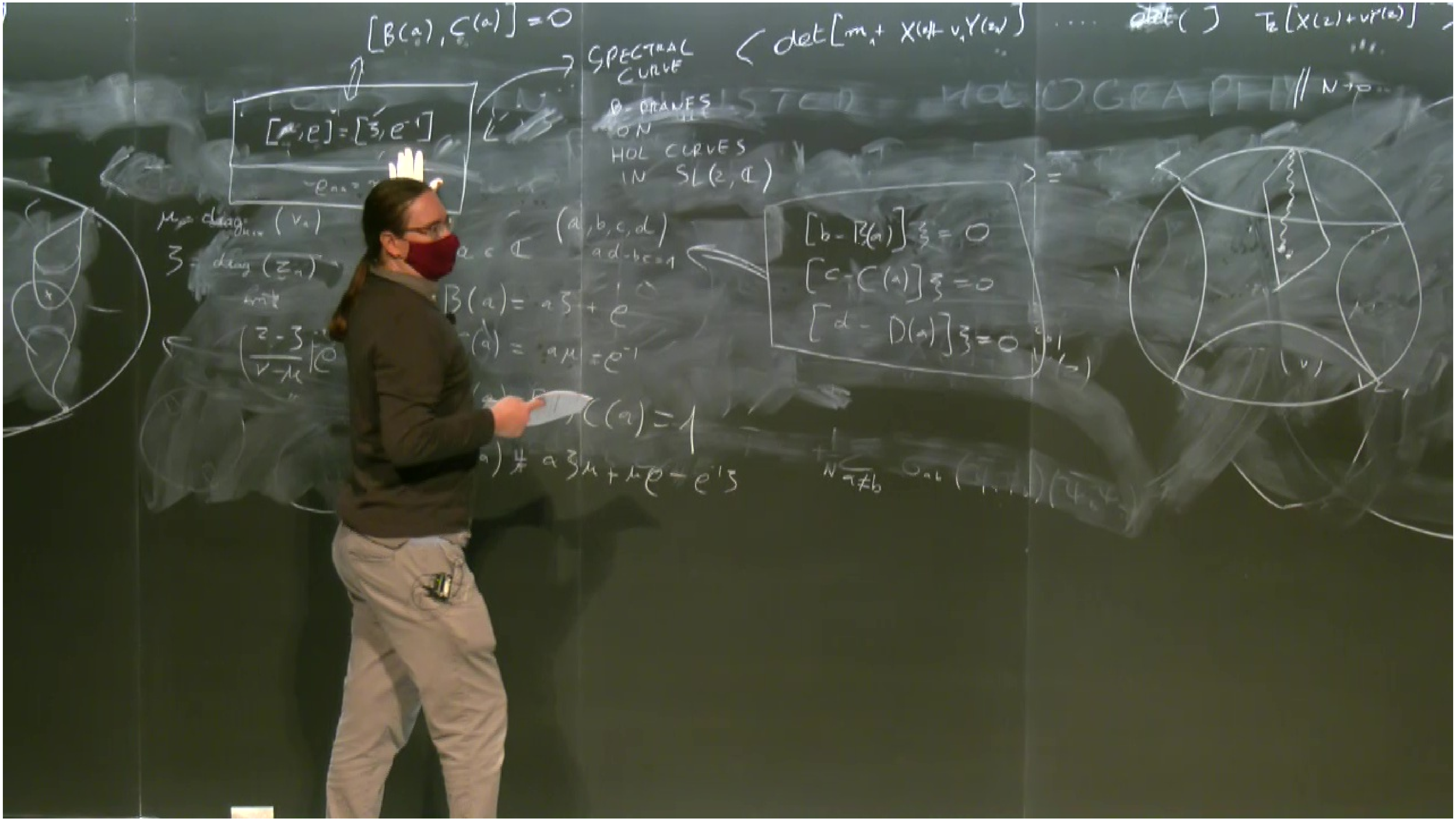
VS
B-BRANES
ON
HOL CURVES
IN SL(2, ℂ)


ad - bc = 1
g ∈ SL(2, ℂ)
m1, z1, v1
[μ, e] = [ζ, e^-1]
VS
B-BRANES
ON
HOL CURV
IN SL(2
μ = diag (va)
ζ = diag (za)
Z IIB


[B(a), C(a)] = 0
< det[m_1 + X(z_1) + v_1 Y(z_1))
[μ, e] = [ζ, e^{-1}]
e_aa = m_a
VS
B-BRANES
ON
HOL CURVES
IN SL(2, C)
μ = diag_{N×N} (v_a)
ζ = diag (z_a)
(a, b, c, d)
a ∈ C
ad - bc = 1
B(a) = aζ + e
C(a) = aμ + e^{-1}
aD(a) - B(a) C(a) = 1
D(a) = aζμ + μe + e^{-1}ζ
[b - B(a)] ξ = 0
[c - C(a)] ξ = 0
[d - D(a)] ξ = 0


B-BRANES
ON
HOL CURVES
IN SL(2,ℂ)





[B(a), C(a)] = 0
SPECTRAL CURVE
B-BRANES
ON
HOL CURVES
IN SL(2, C)
[b - B(a)] ξ = 0
[c - C(a)] ξ = 0
[d - D(a)] ξ = 0