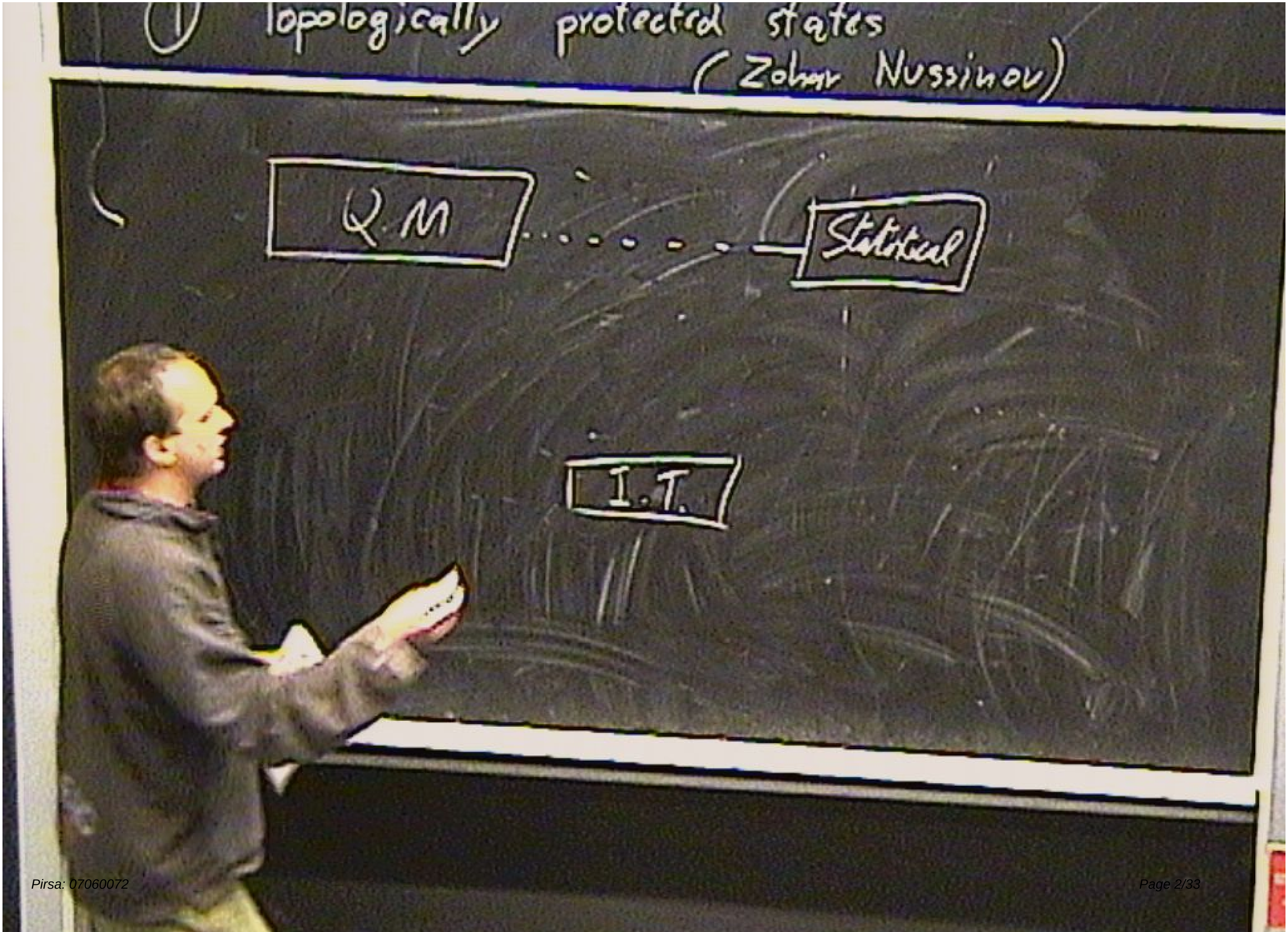
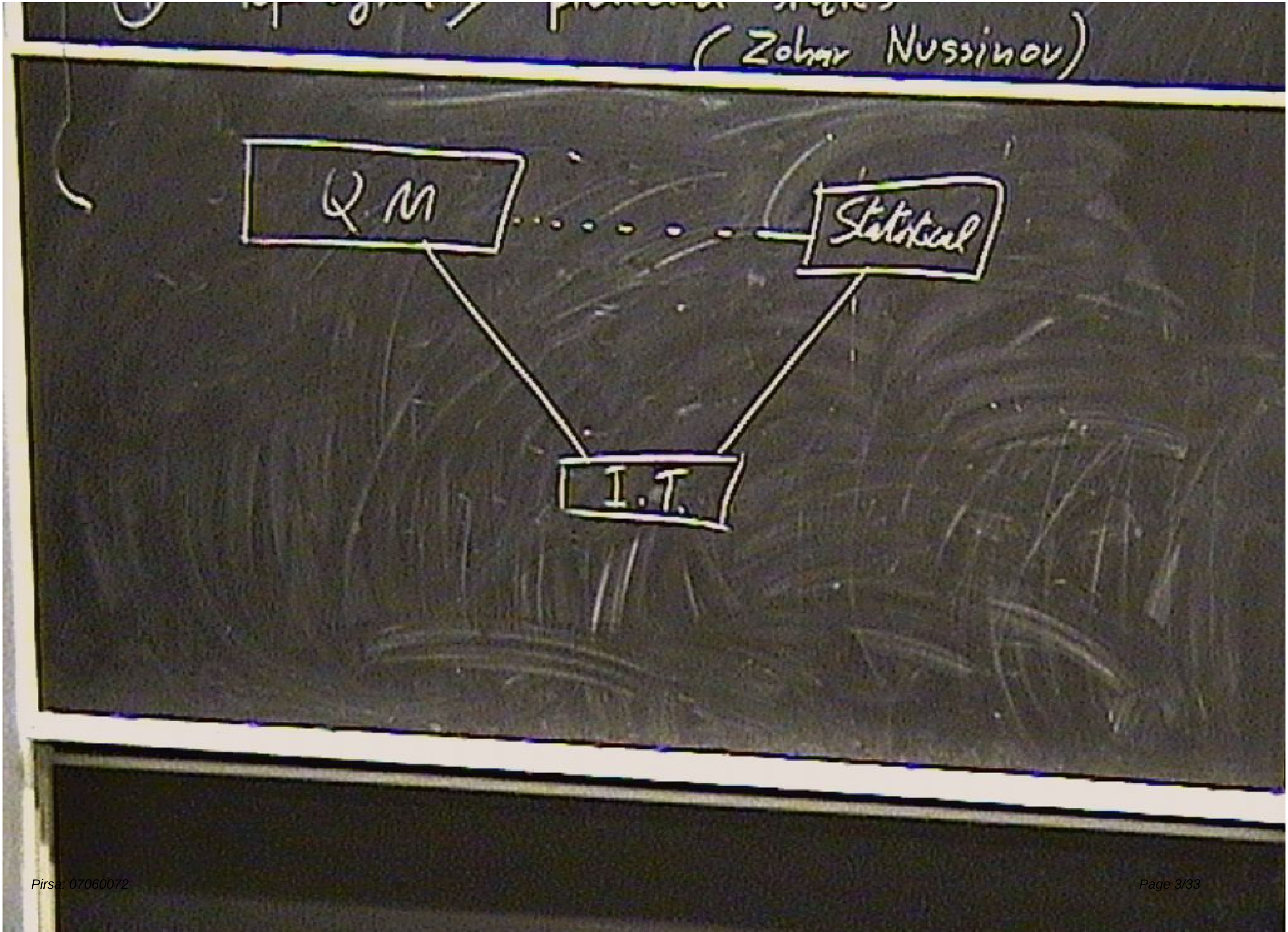
Title: Manybody Physics meets Quantum Information

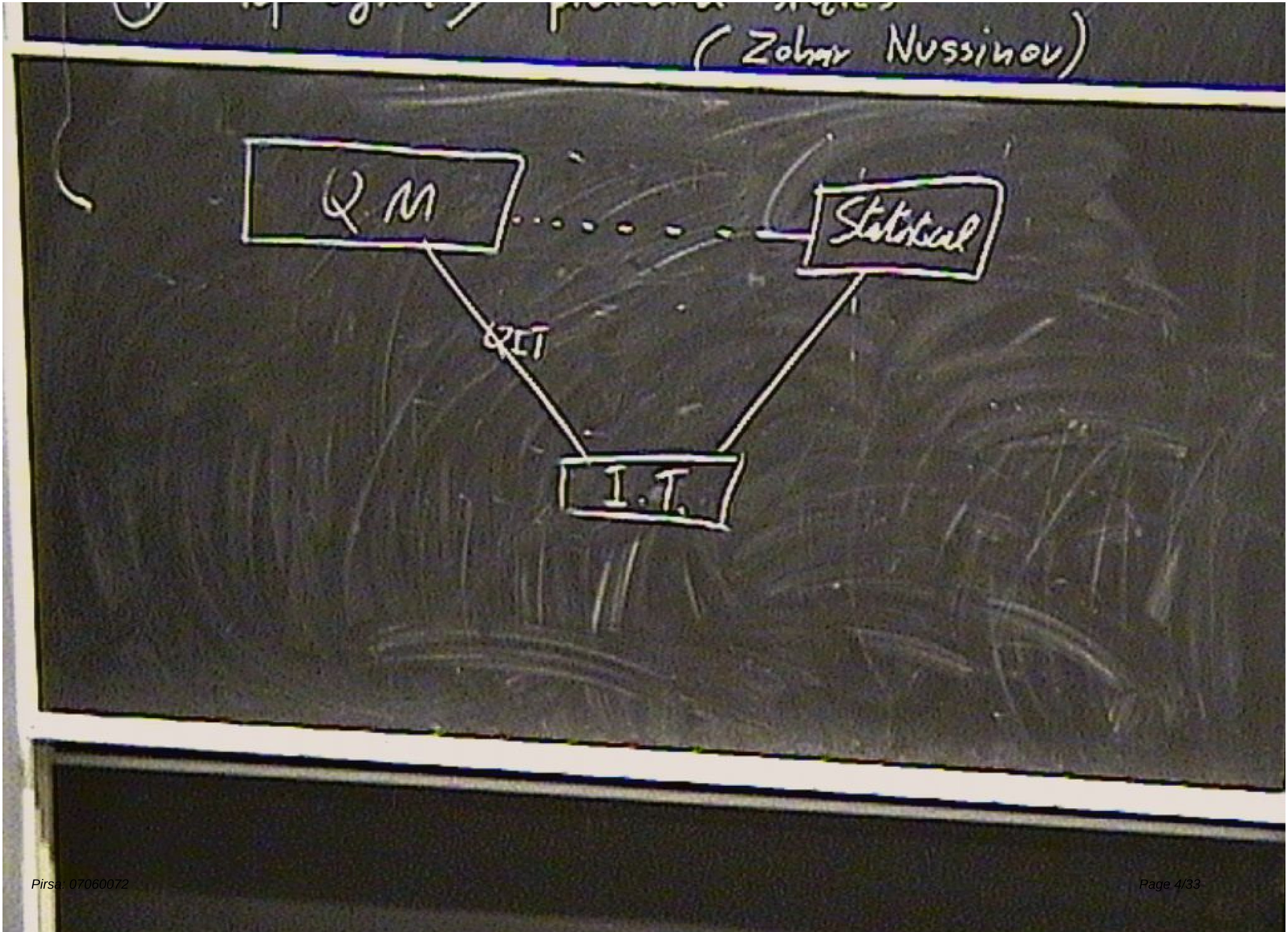
Date: Jun 26, 2007 05:00 PM

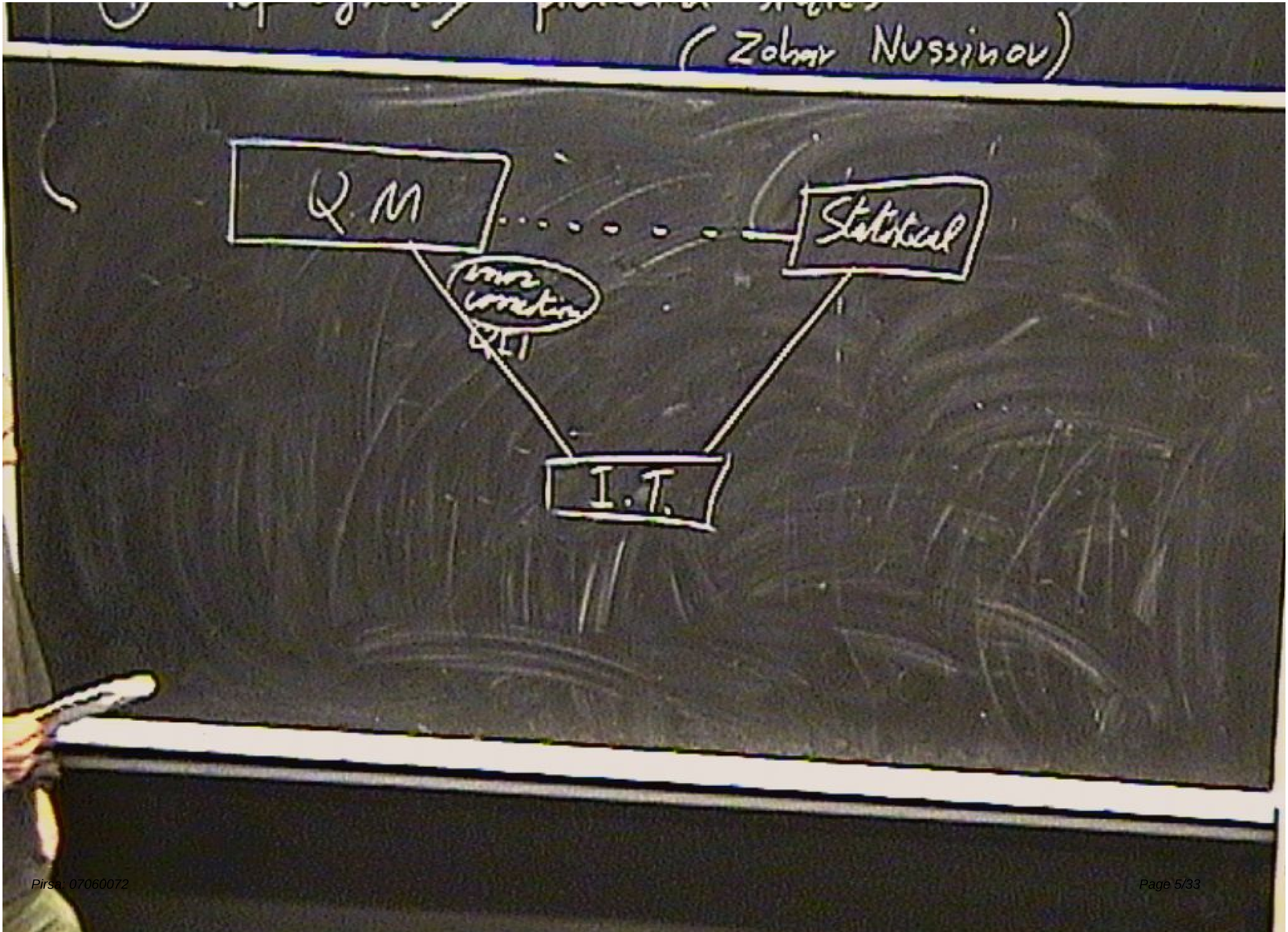
URL: http://pirsa.org/07060072

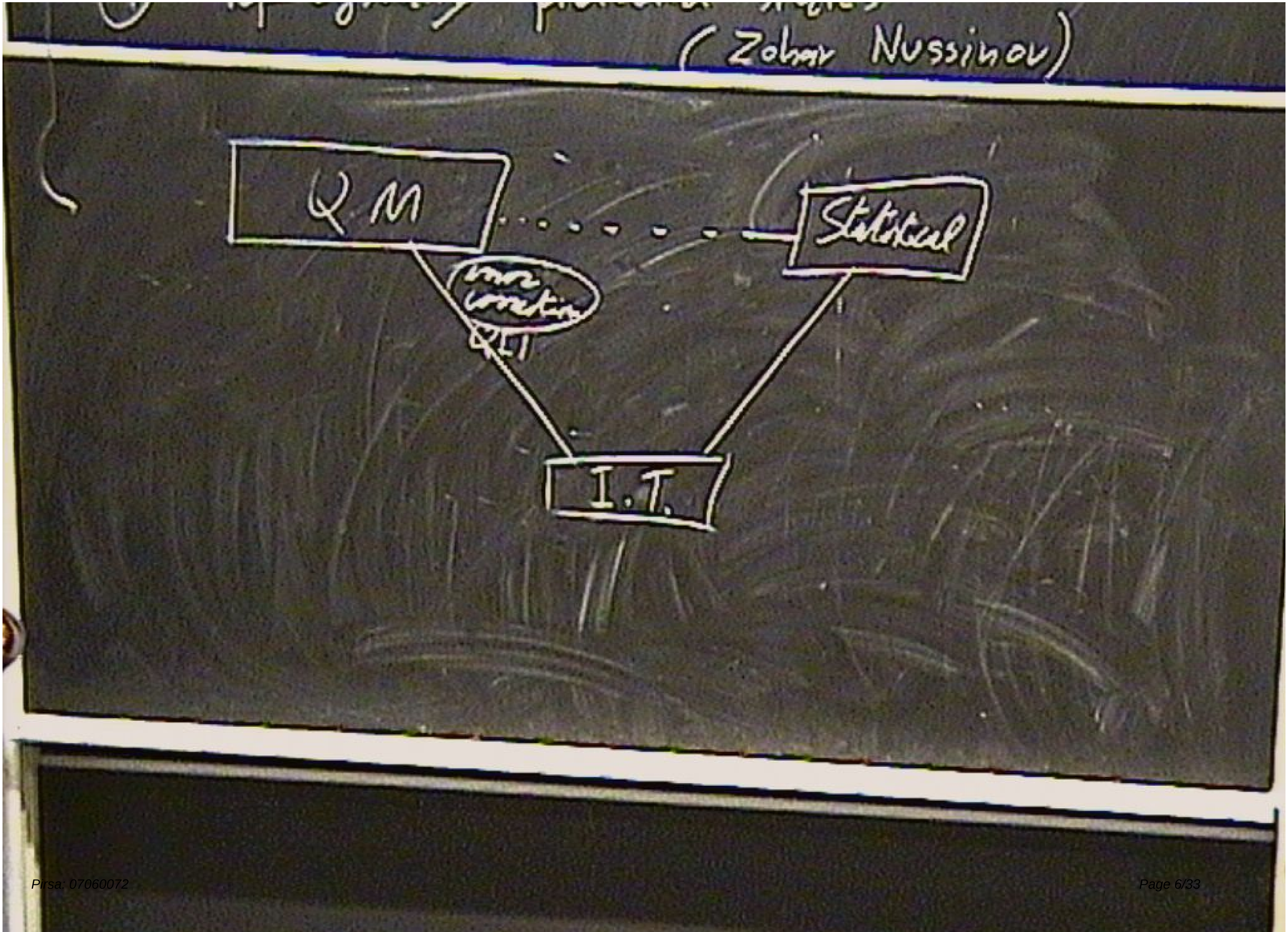
Abstract:

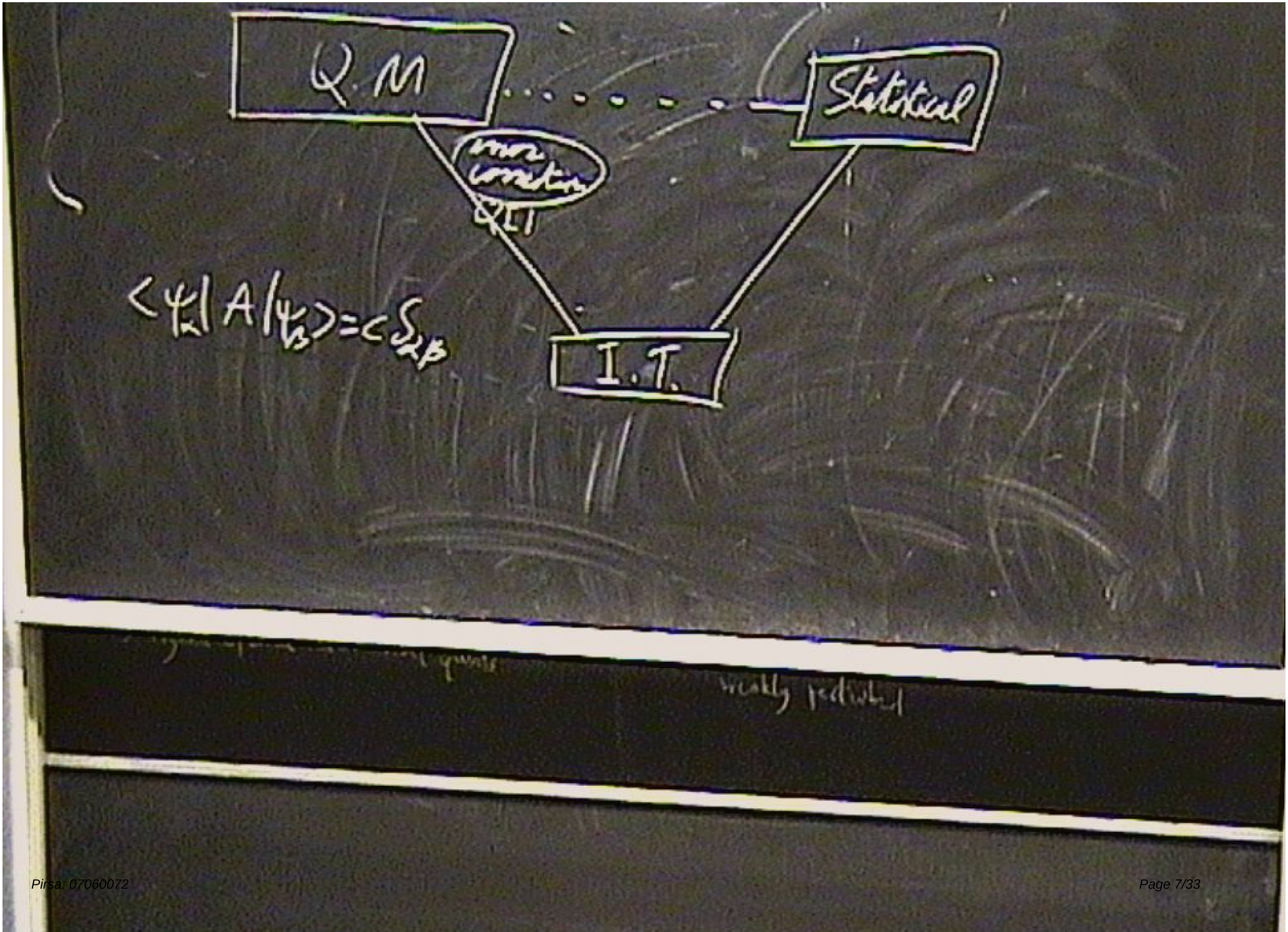

① Topologically protected states
(Zohar Nussinov)
Q.M
Statistical
I.T.

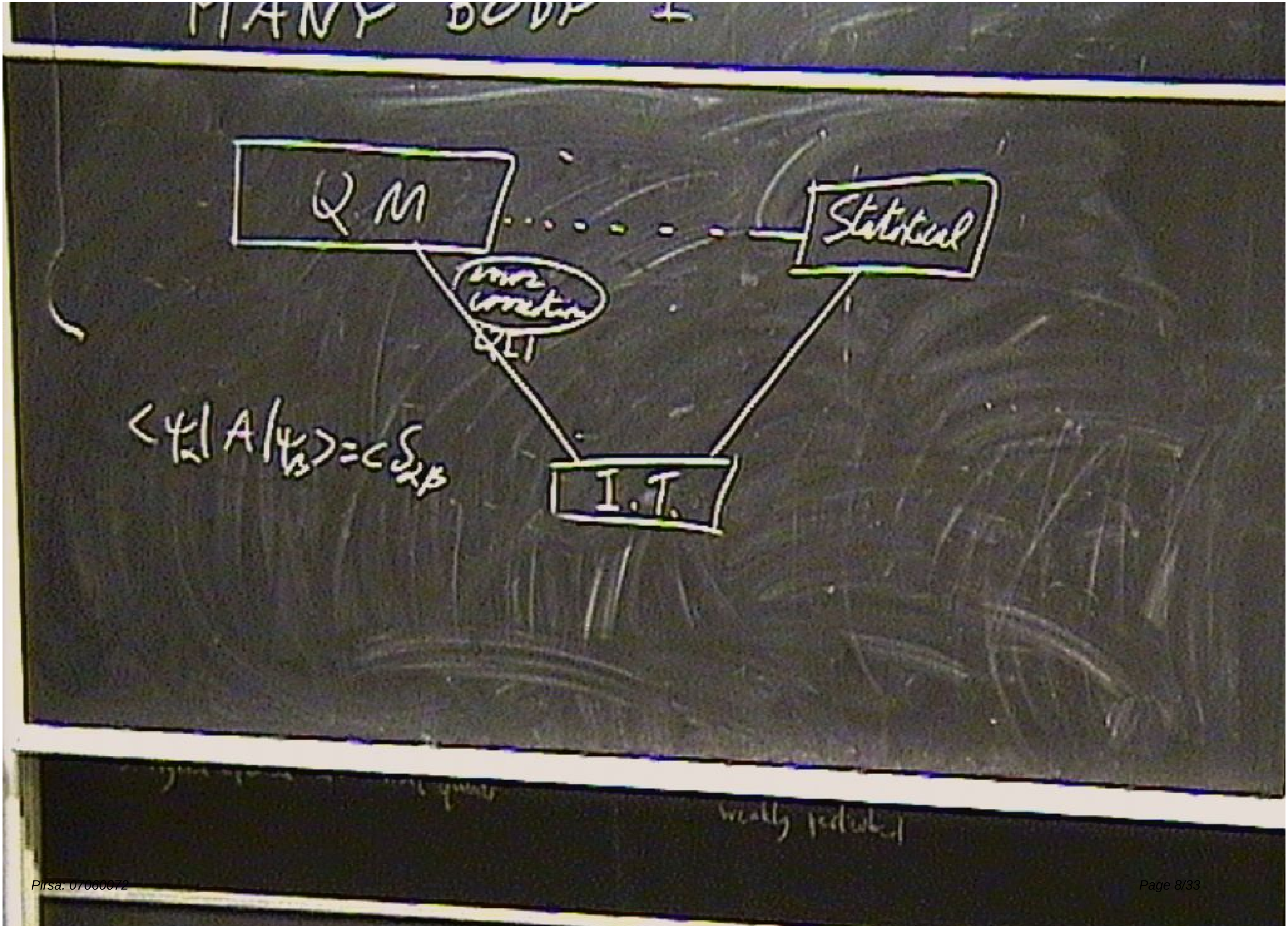

(Zohar Nussinov)
Q.M
Statistical
I.T.

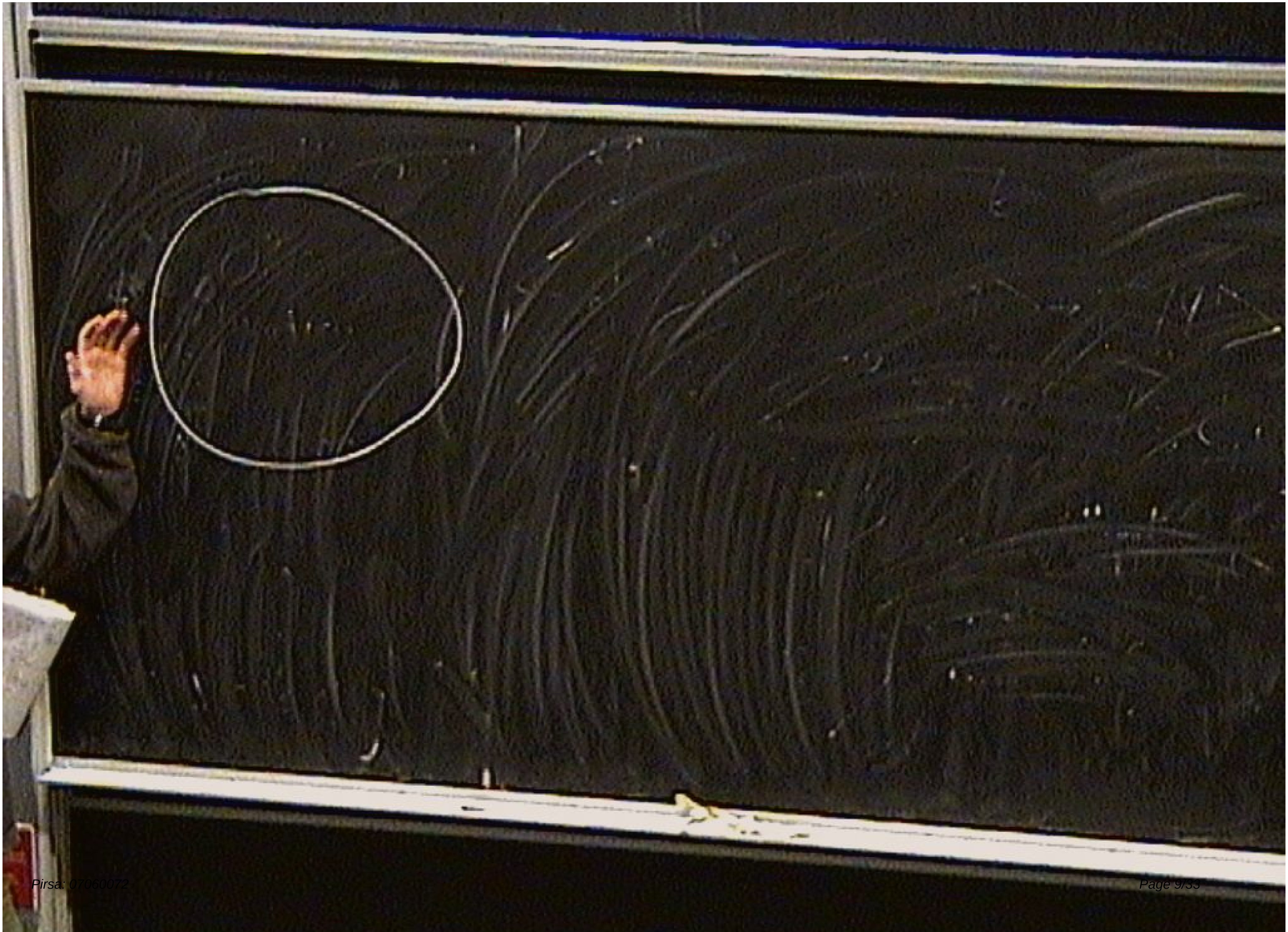

(Zohar Nussinov)
Q.M
Statistical
QIT
I.T.

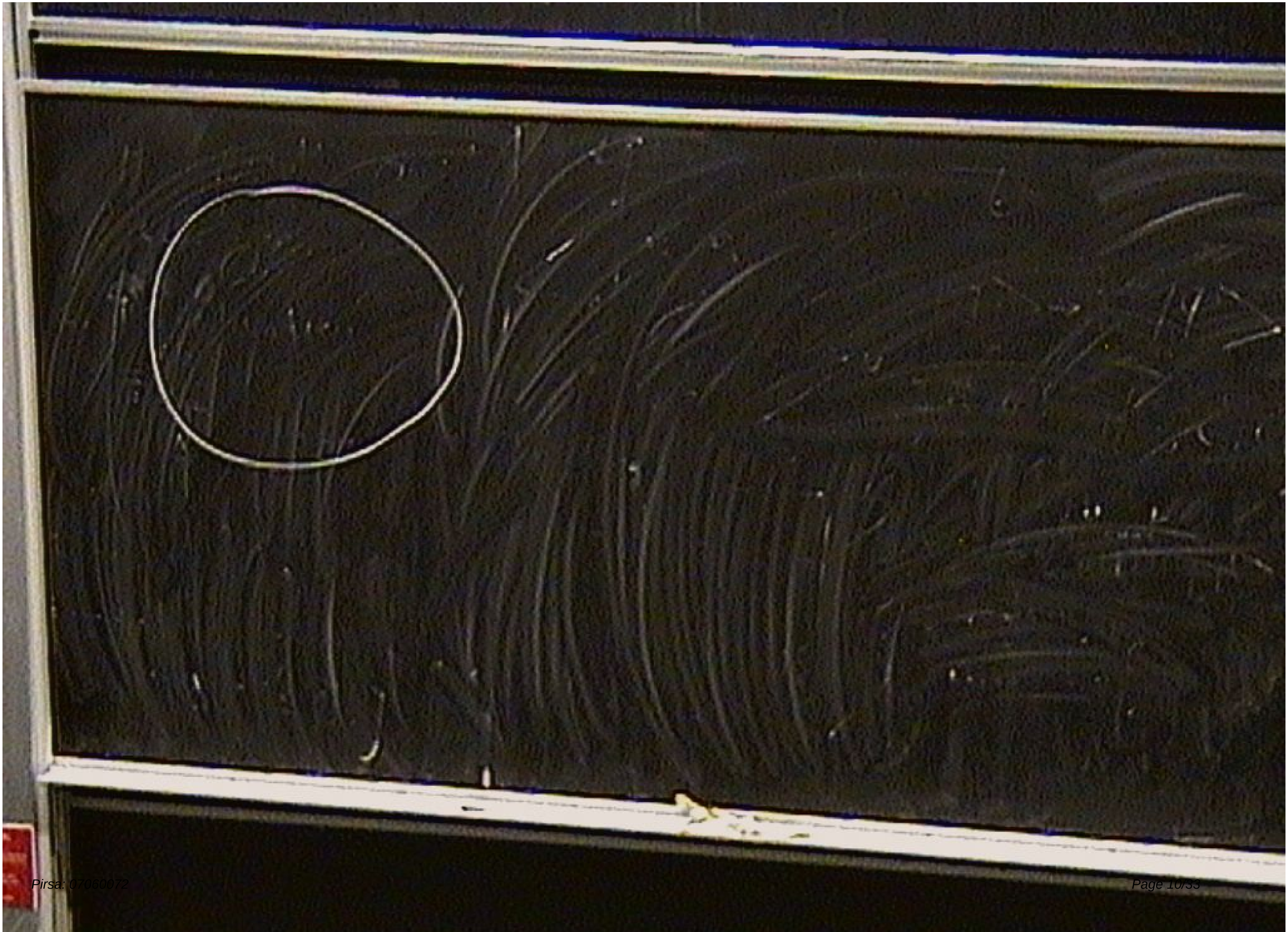

(Zohar Nussinov)
Q.M
Statistical
I.T.

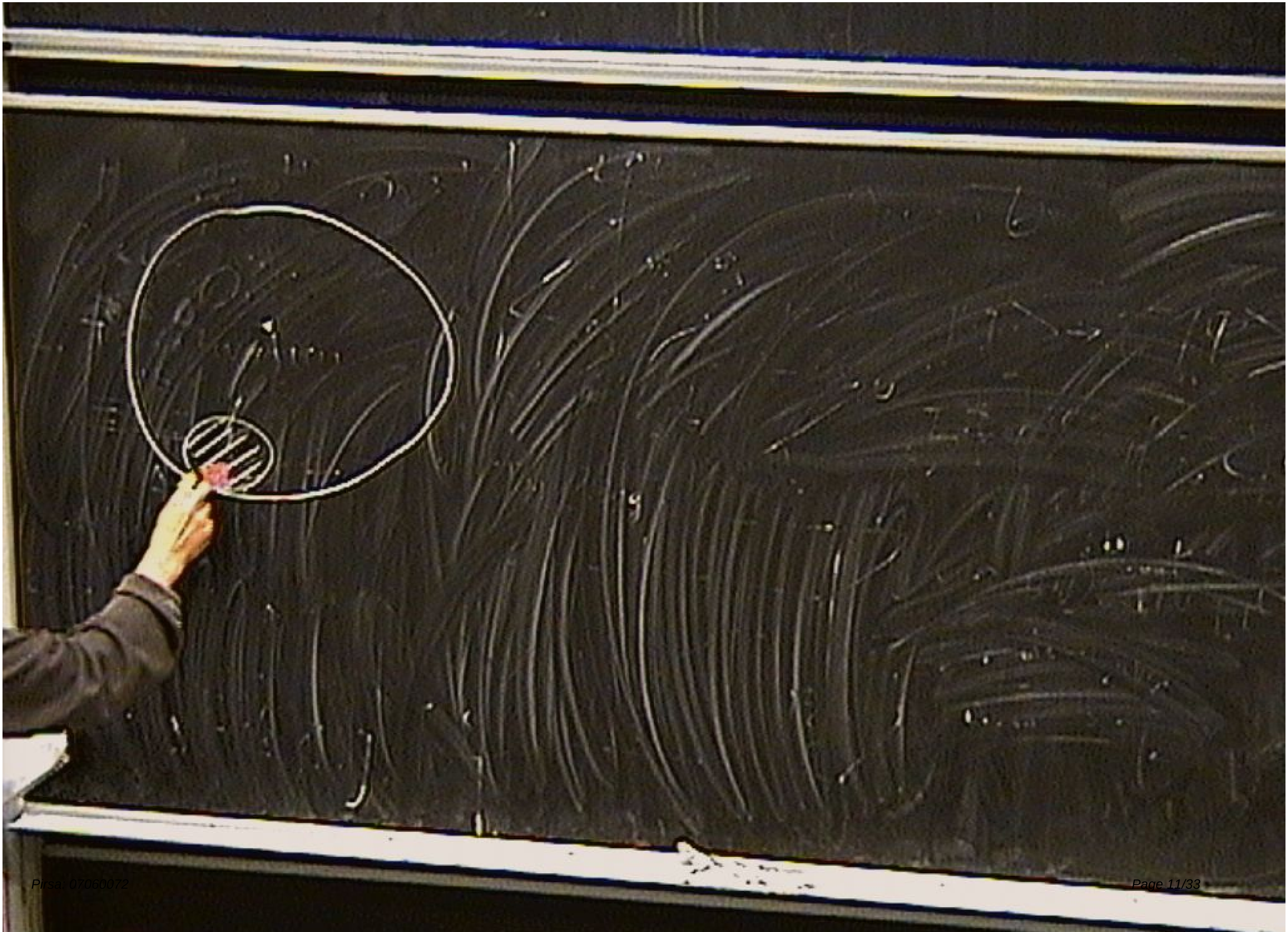

(Zohar Nussinov)
QM
Statistical
I.T.

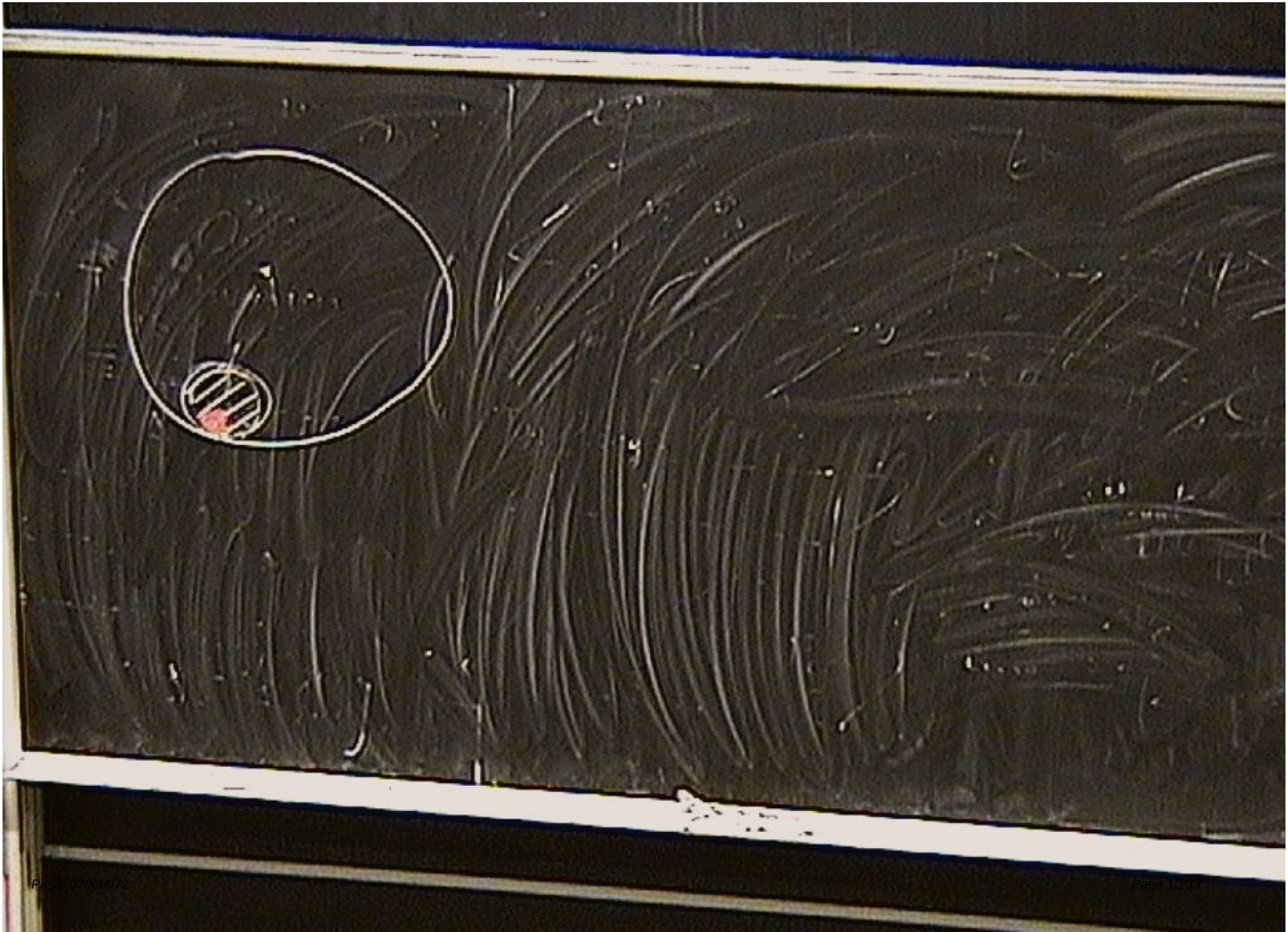

Q.M
Statistical
I.T.
weakly perturbed

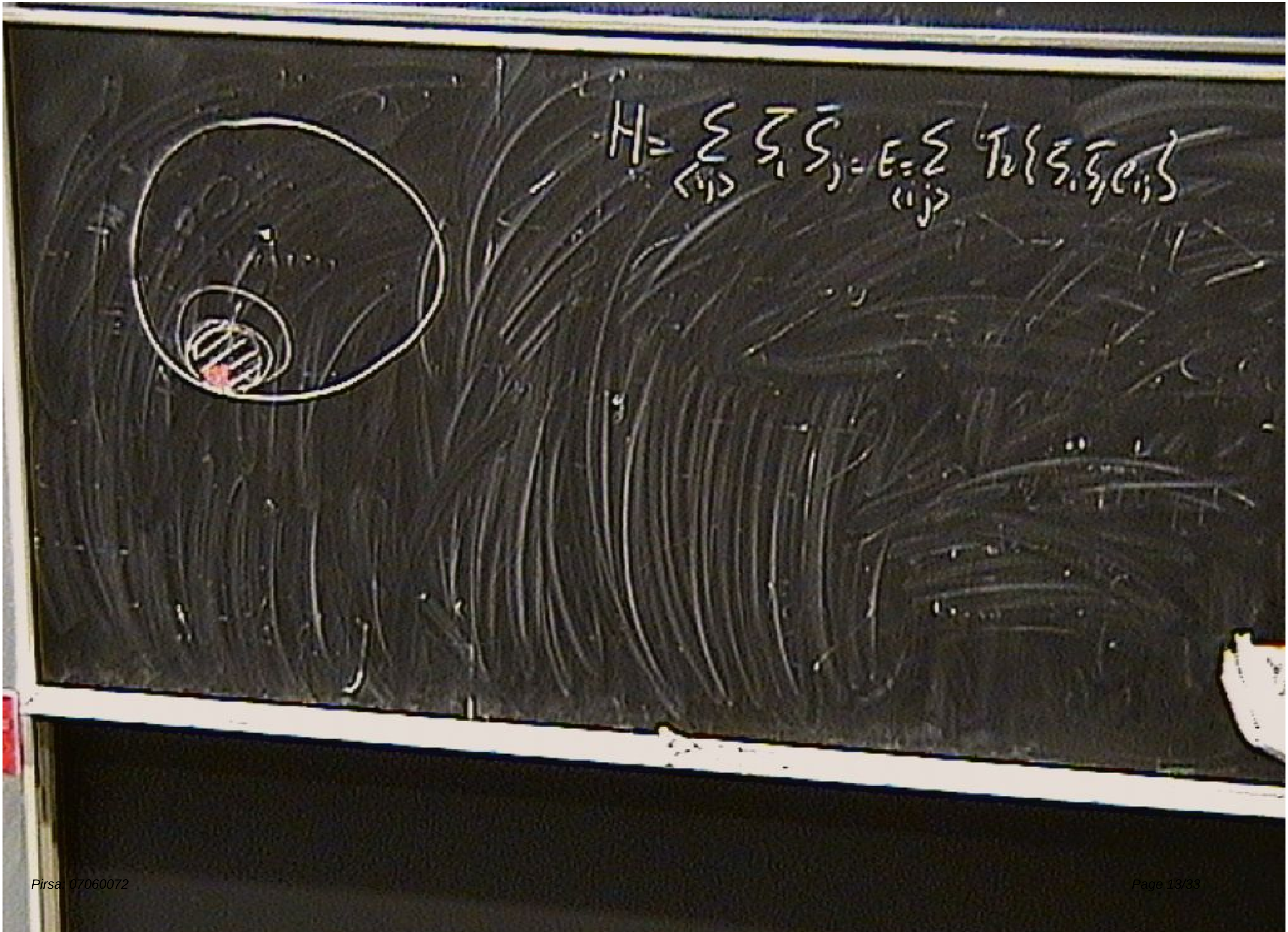

Q M
Statistical
I.T.
weakly perturbed

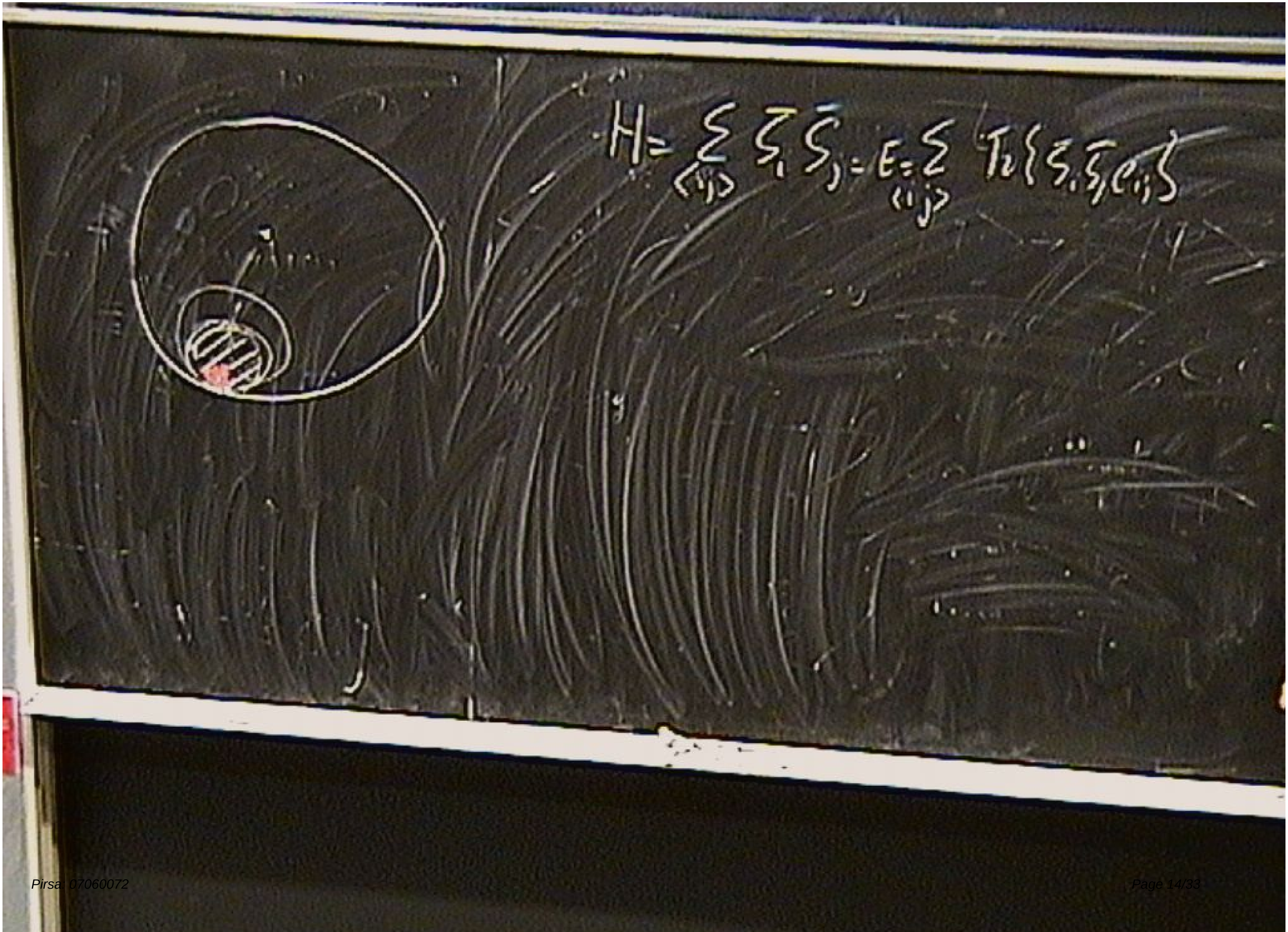


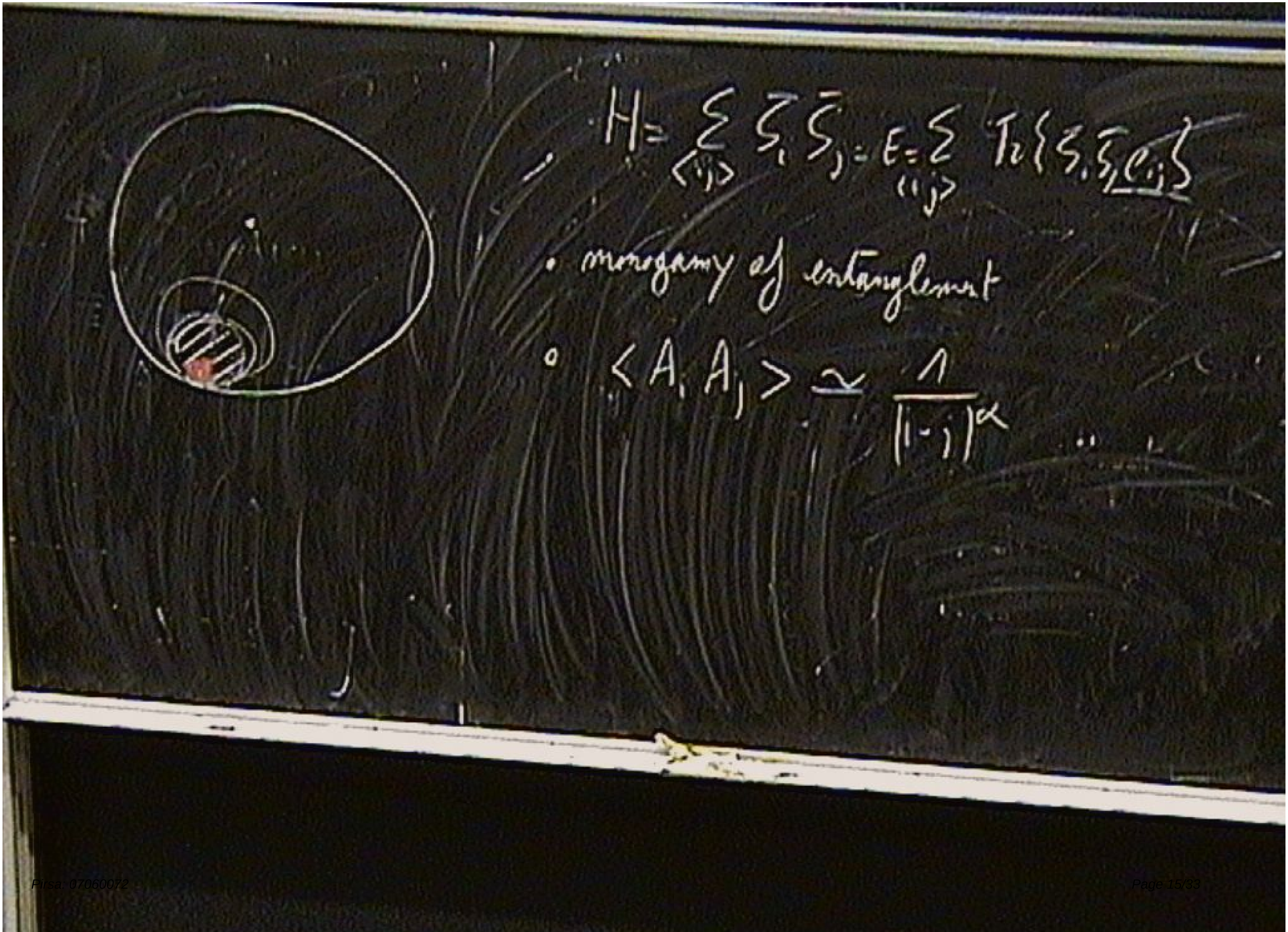


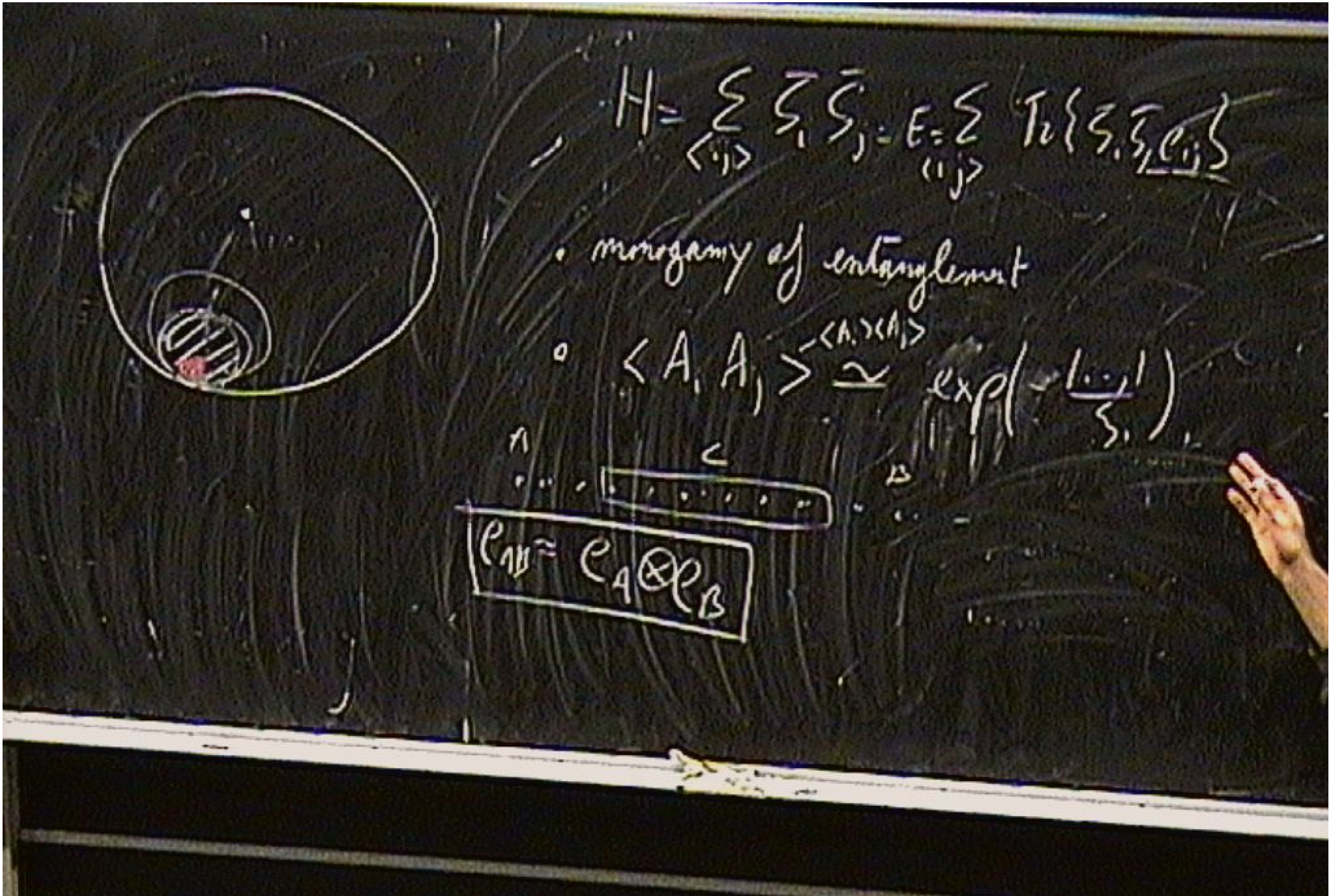





H = Σ S_i S_j - E = Σ Tr{S_i S_j C_ij}


H = Σ S_i S_j = E Σ Tr{S_i S_j e_ij}
⟨ij⟩ ⟨ij⟩
Area


$H = \sum_{\langle ij \rangle} \vec{S}_i \vec{S}_j = E = \sum_{\langle ij \rangle} \mathrm{Tr}\{\vec{S}_i \vec{S}_j \rho_{ij}\}$
• monogamy of entanglement
• $\langle A_i A_j \rangle \simeq \frac{1}{|i-j|^\alpha}$
i

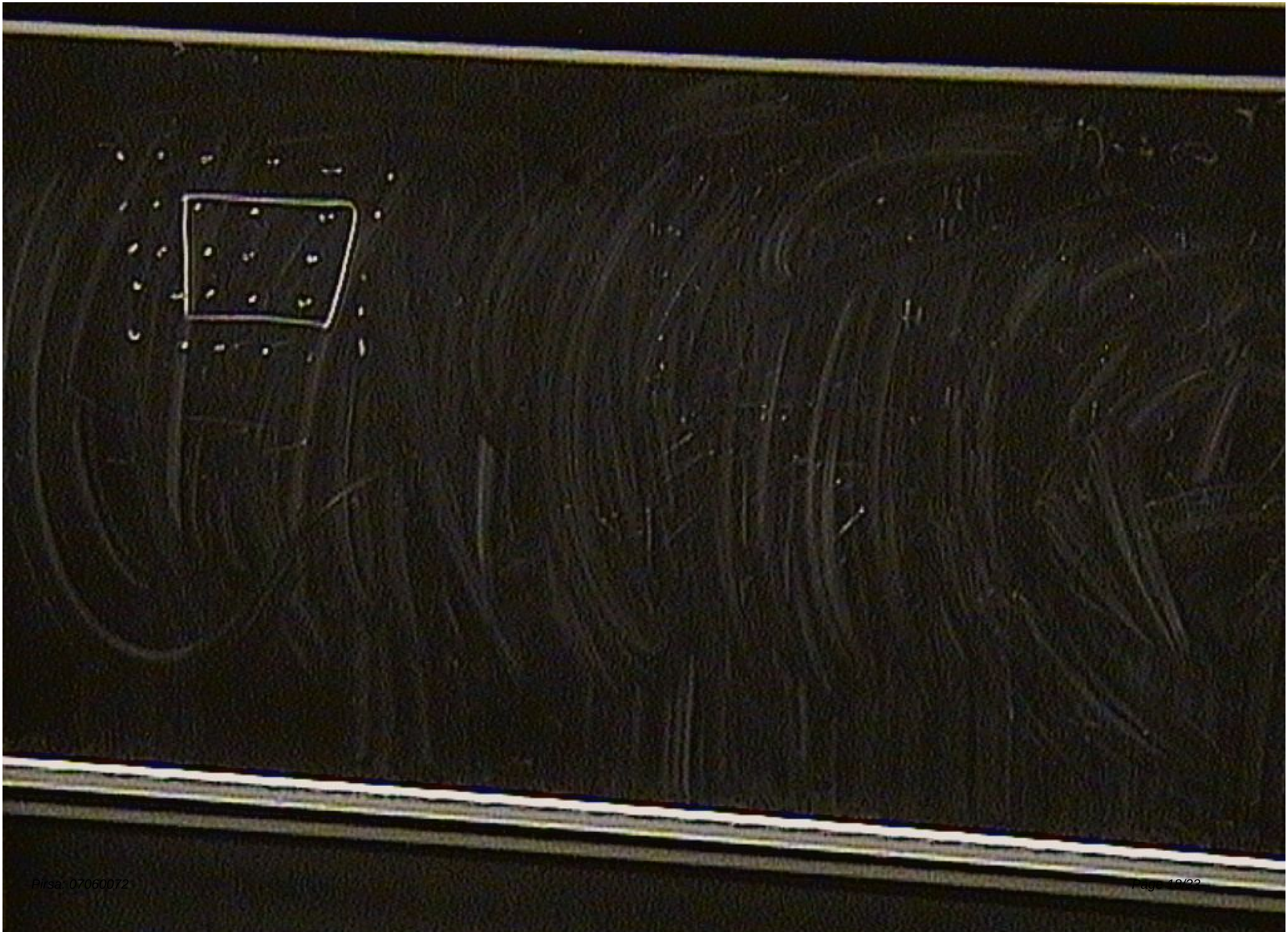

H = Σ_{<ij>} S_i S_j : E = Σ_{<ij>} Tr{S_i S_j ρ_ij}
monogamy of entanglement
<A_i A_j> − <A_i><A_j> ≃ exp(−|i−j|/ξ)
ρ_AB ≃ ρ_A ⊗ ρ_B

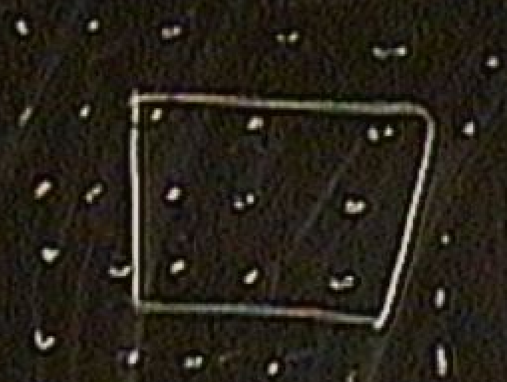
$$H = \sum_{\langle ij \rangle} \vec{S}_i \vec{S}_j \quad E = \sum_{\langle ij \rangle} \mathrm{Tr}\{\vec{S}_i \vec{S}_j \rho_{ij}\}$$

- monogamy of entanglement
- $\langle A_i A_j \rangle - \langle A_i \rangle \langle A_j \rangle \simeq \exp\left(-\frac{|i-j|}{\xi}\right)$

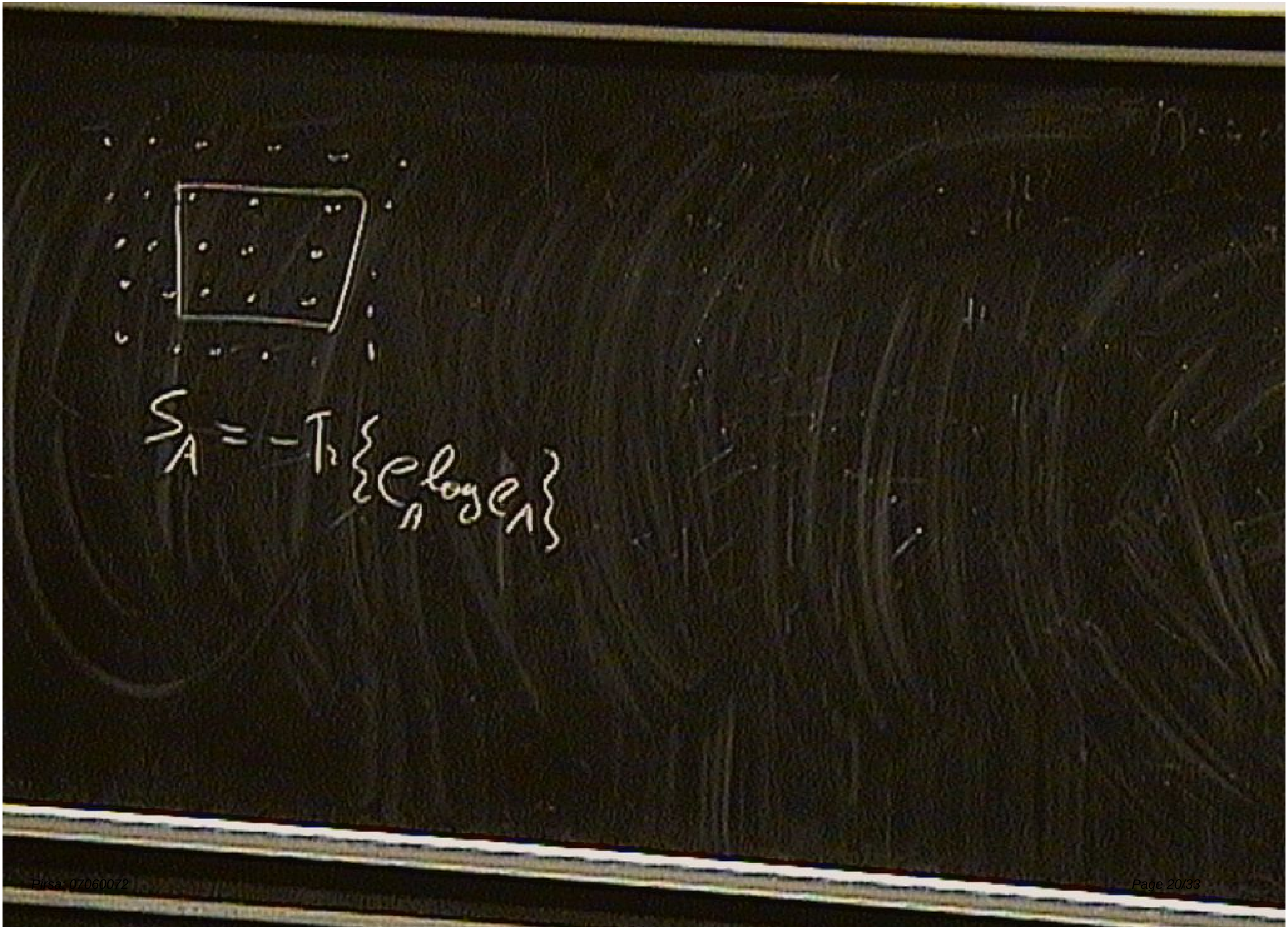
$$\rho_{AB} \approx \rho_A \otimes \rho_B$$

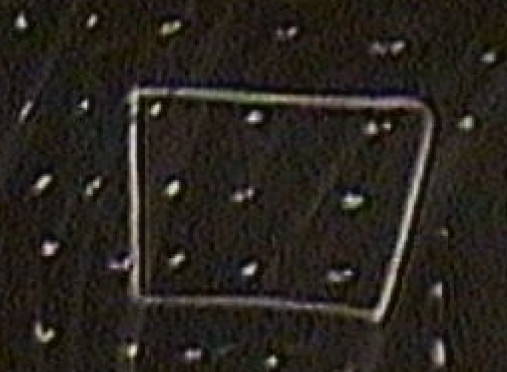
$$S_A + S_B - S_{AB} \leq \varepsilon$$





$$S_A = -\mathrm{Tr}\{\rho_A \log \rho_A\}$$

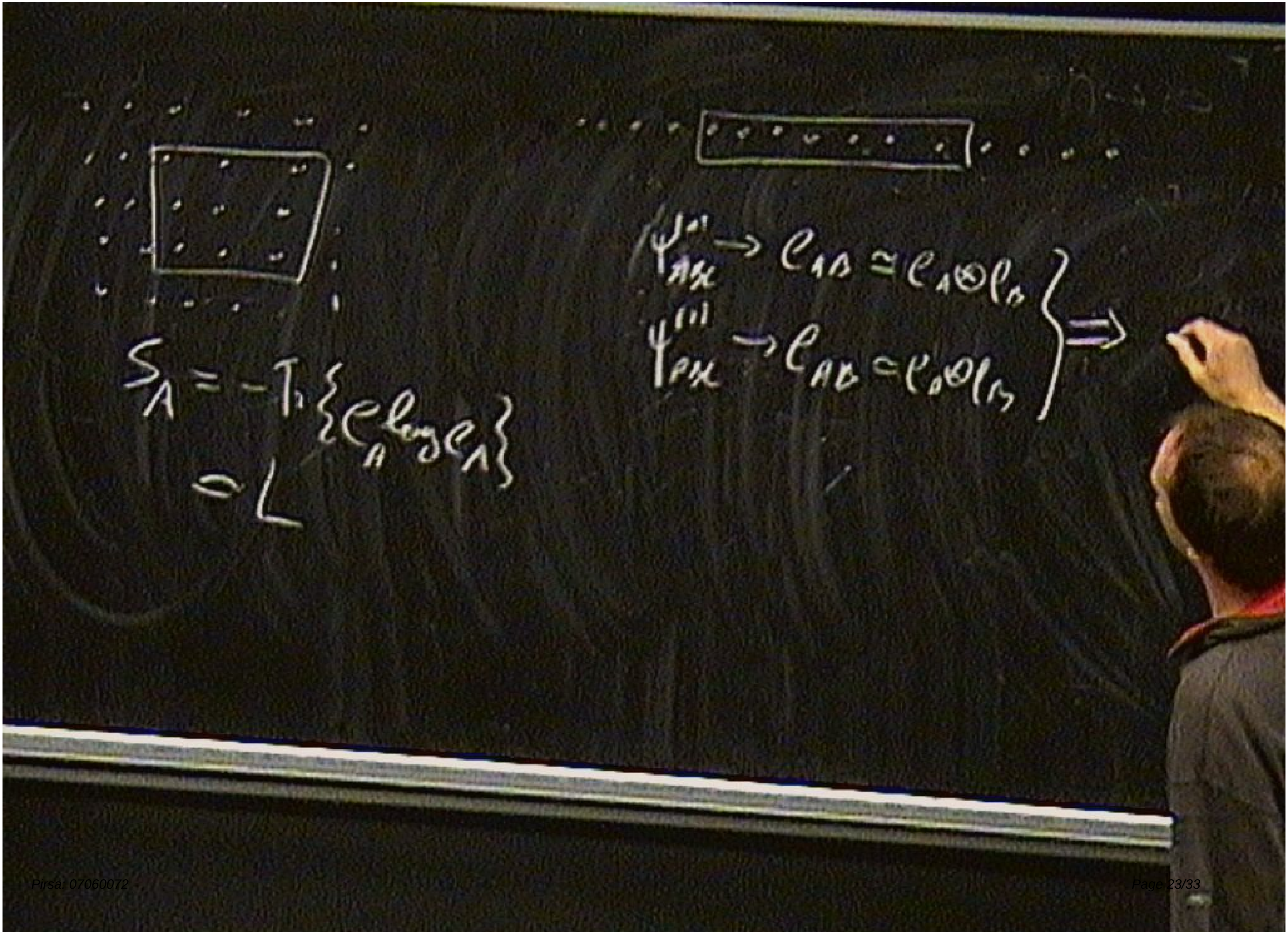

S_A = -Tr{ρ_A log ρ_A}

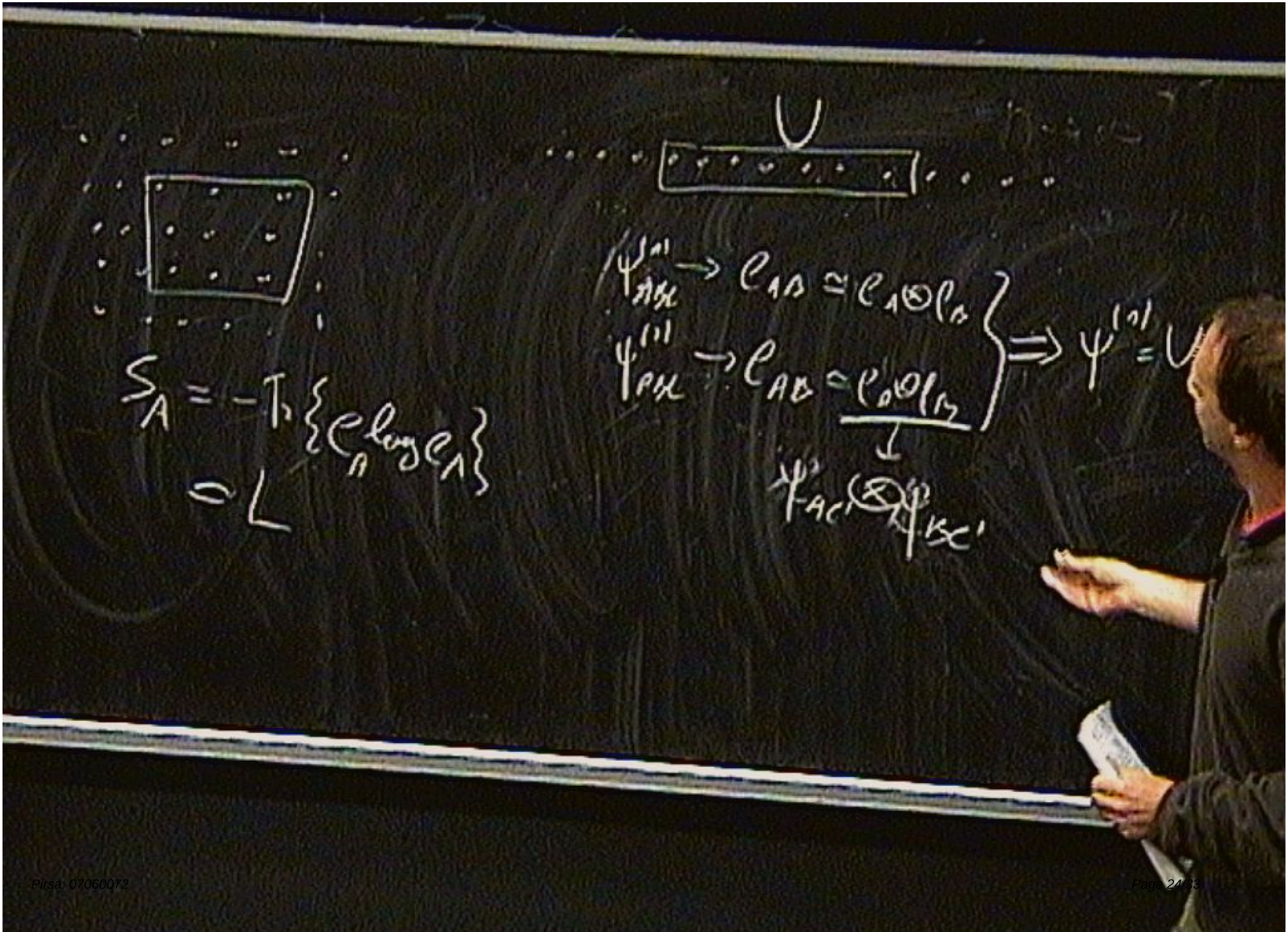


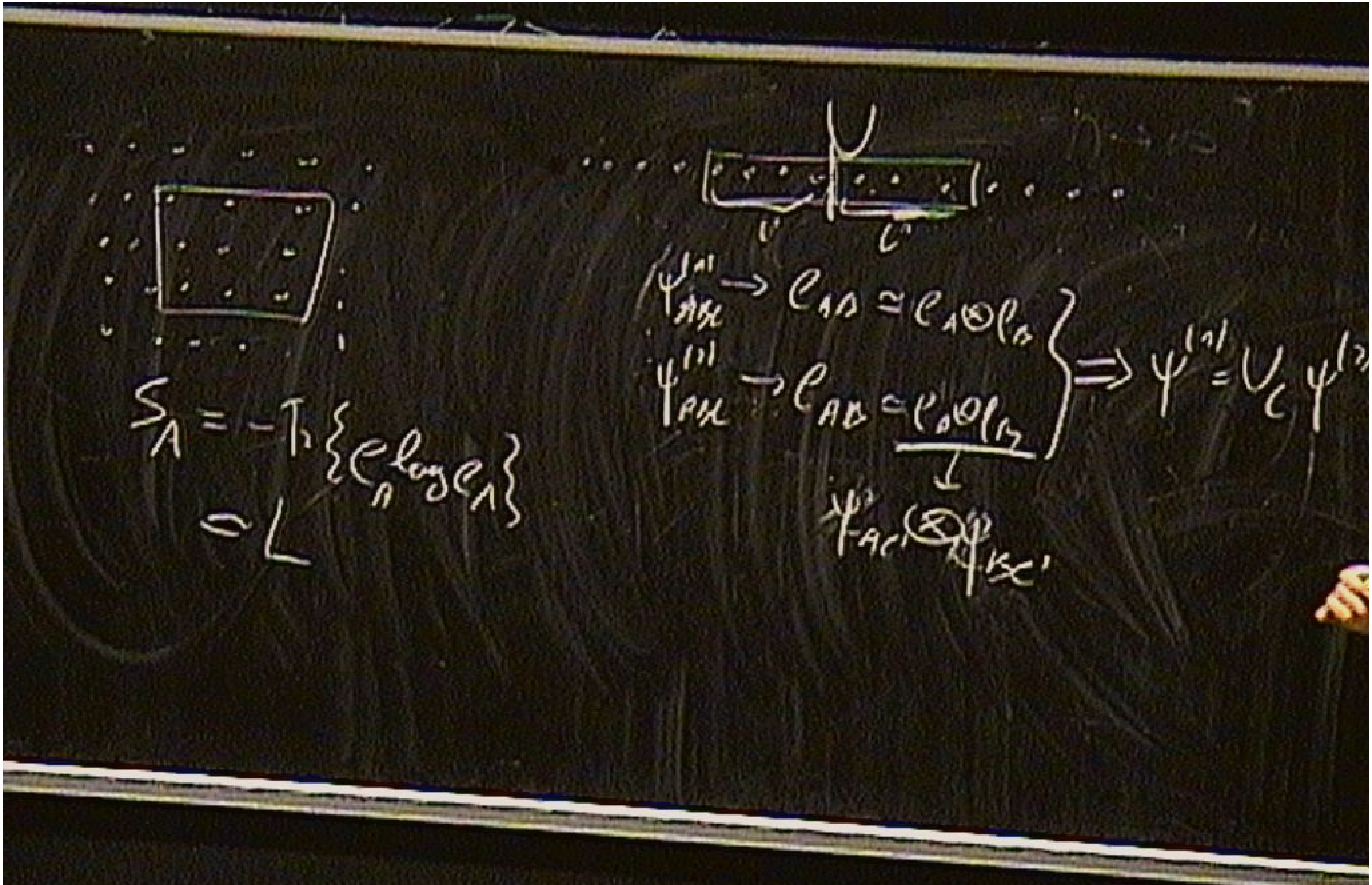
$$S_A = -\mathrm{Tr}\{\rho_A \log \rho_A\}$$

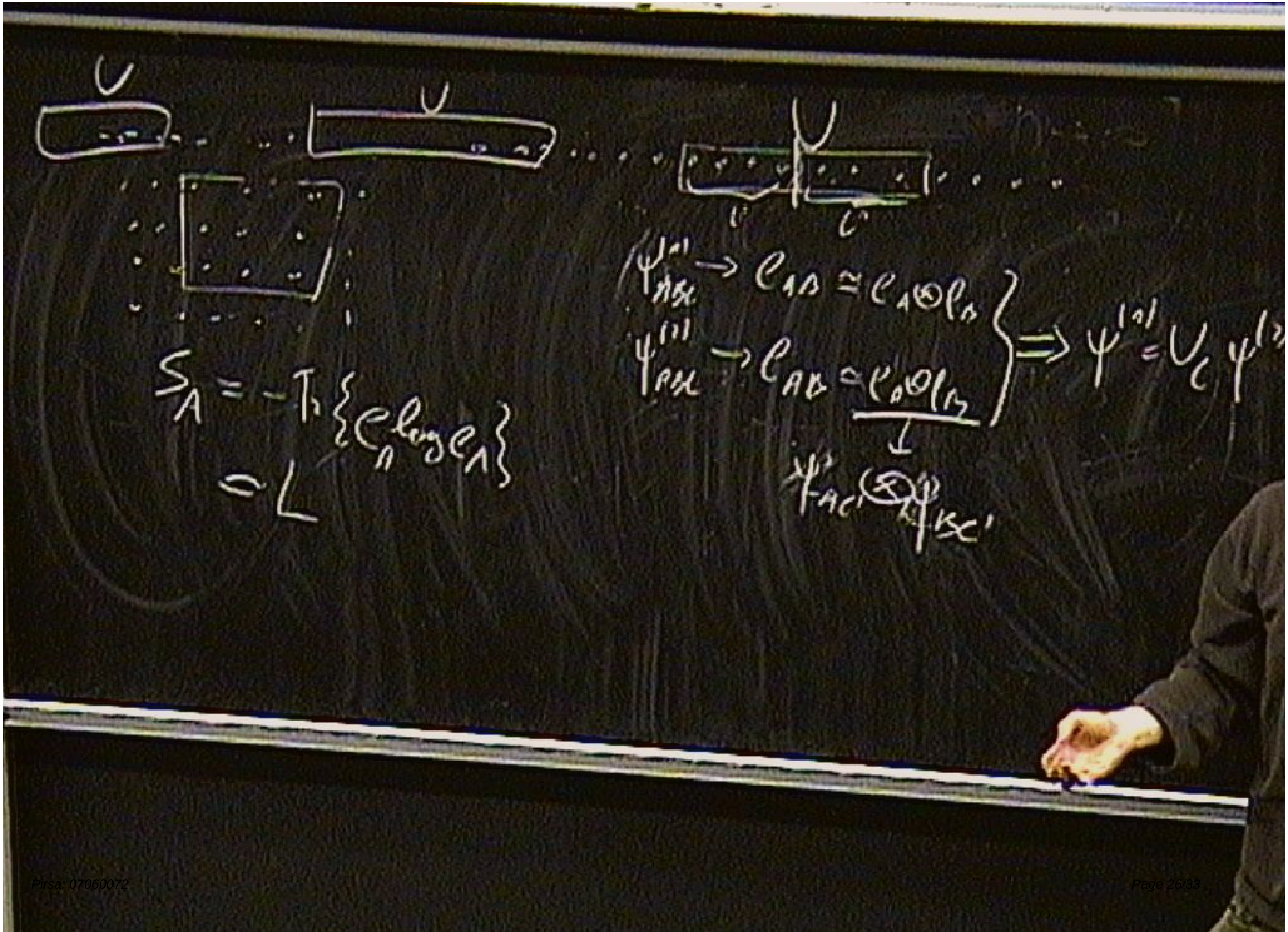
$$\propto L$$

$$S_\Lambda = -\mathrm{Tr}\{\rho_\Lambda \log \rho_\Lambda\}$$
$$\simeq L$$

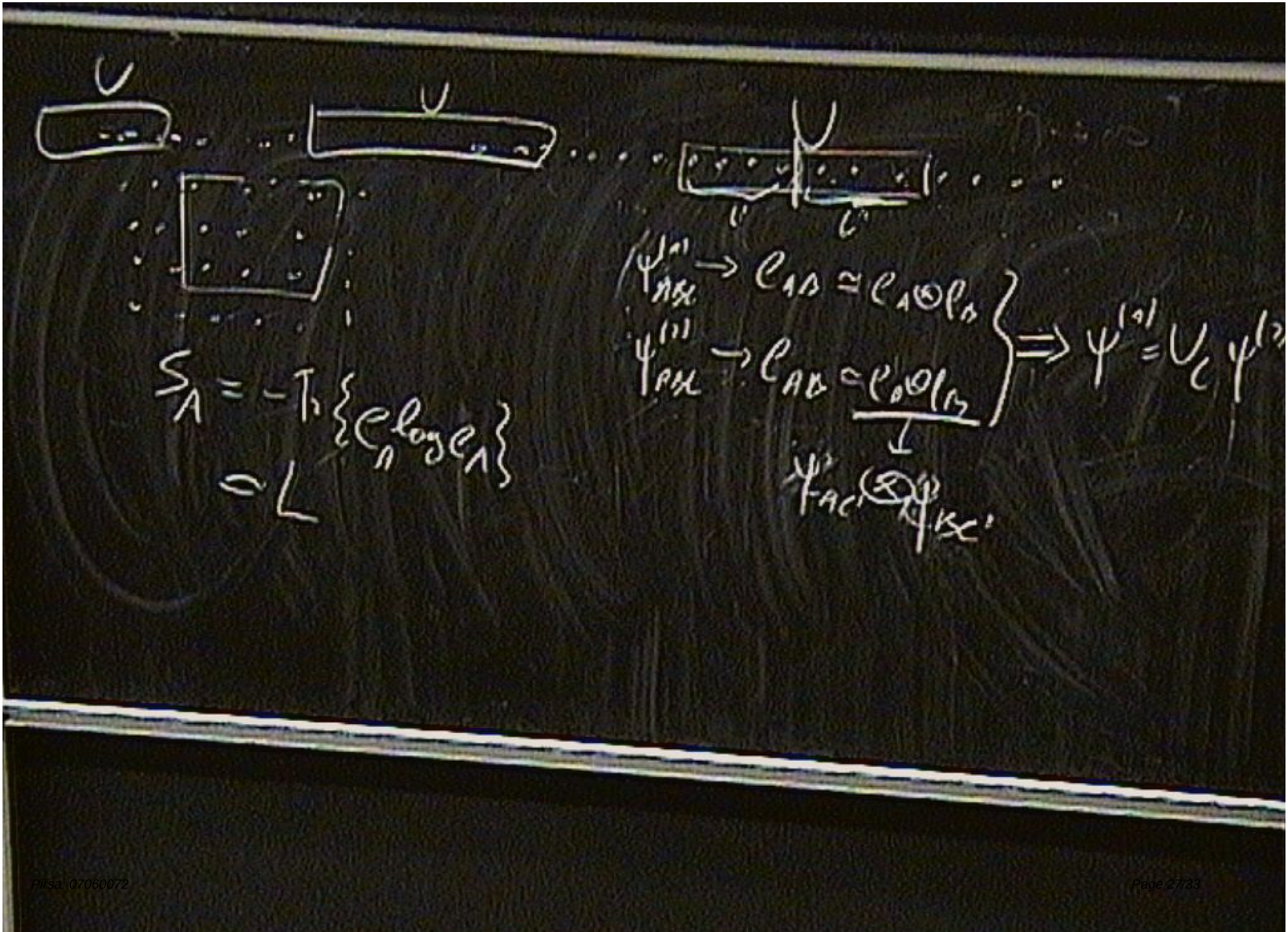

S_A = -Tr{ρ_A log ρ_A}
= L
ψ → ρ_AB ≈ ρ_A ⊗ ρ_B
ψ → ρ_AB ≈ ρ_A ⊗ ρ_B

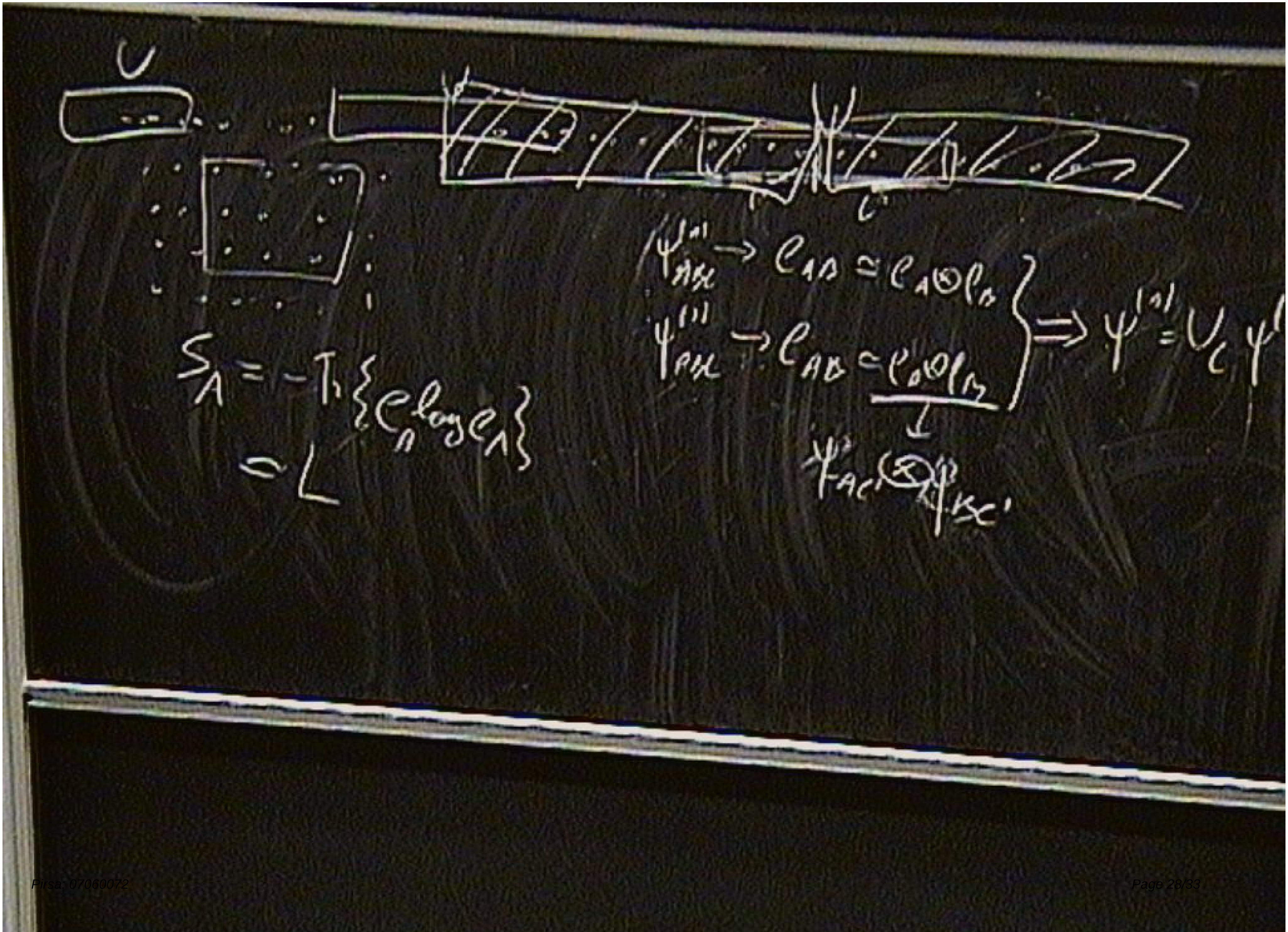


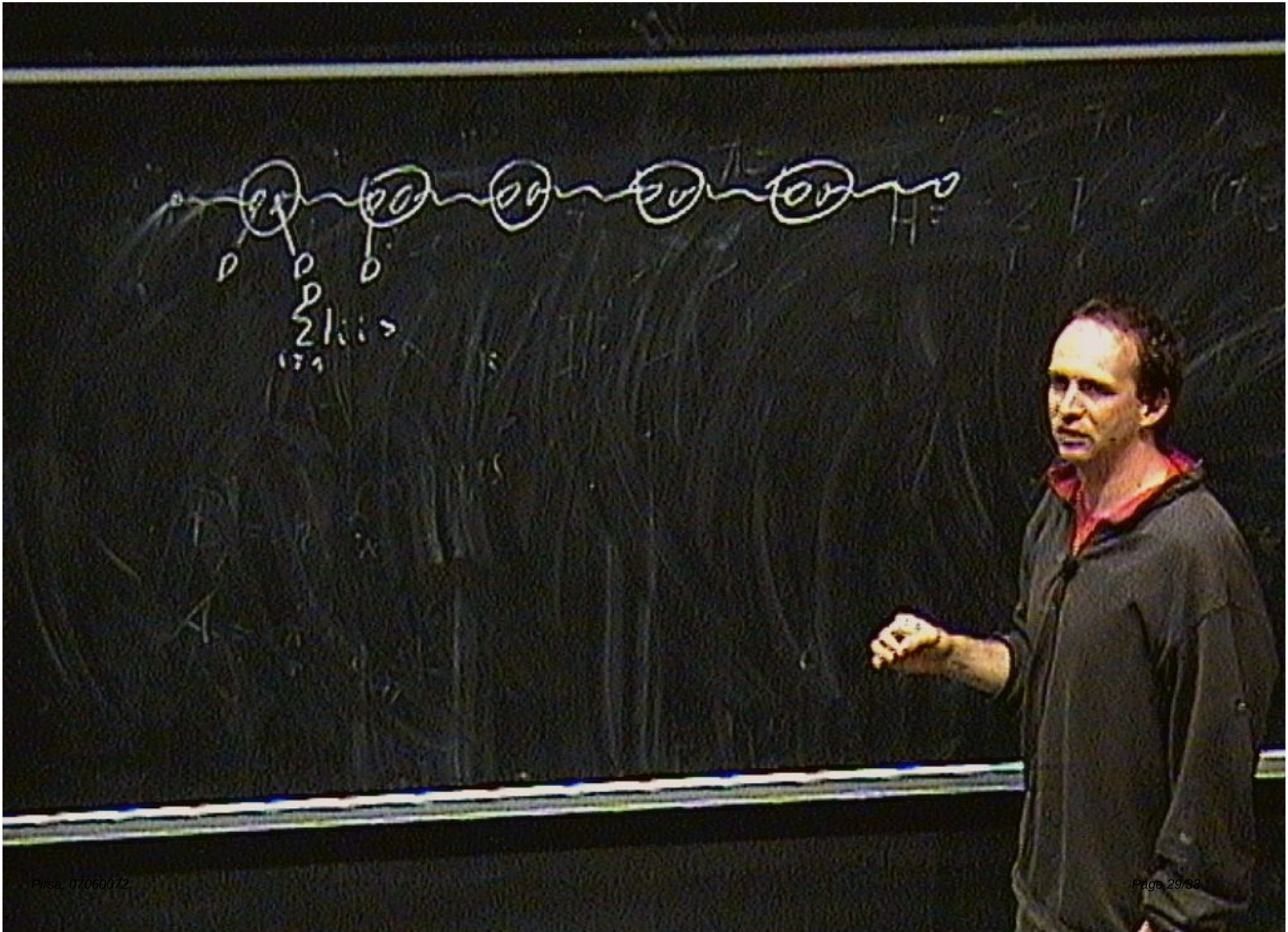

S_A = -Tr{ρ_A log ρ_A}
≃ L
ψ^(1)_ABC → ρ_AB ≃ ρ_A ⊗ ρ_B
ψ^(2)_ABC → ρ_AB ≃ ρ_A ⊗ ρ_B
⇒ ψ^(1) = U_C ψ^(2)
ψ_AC' ⊗ ψ_BC'

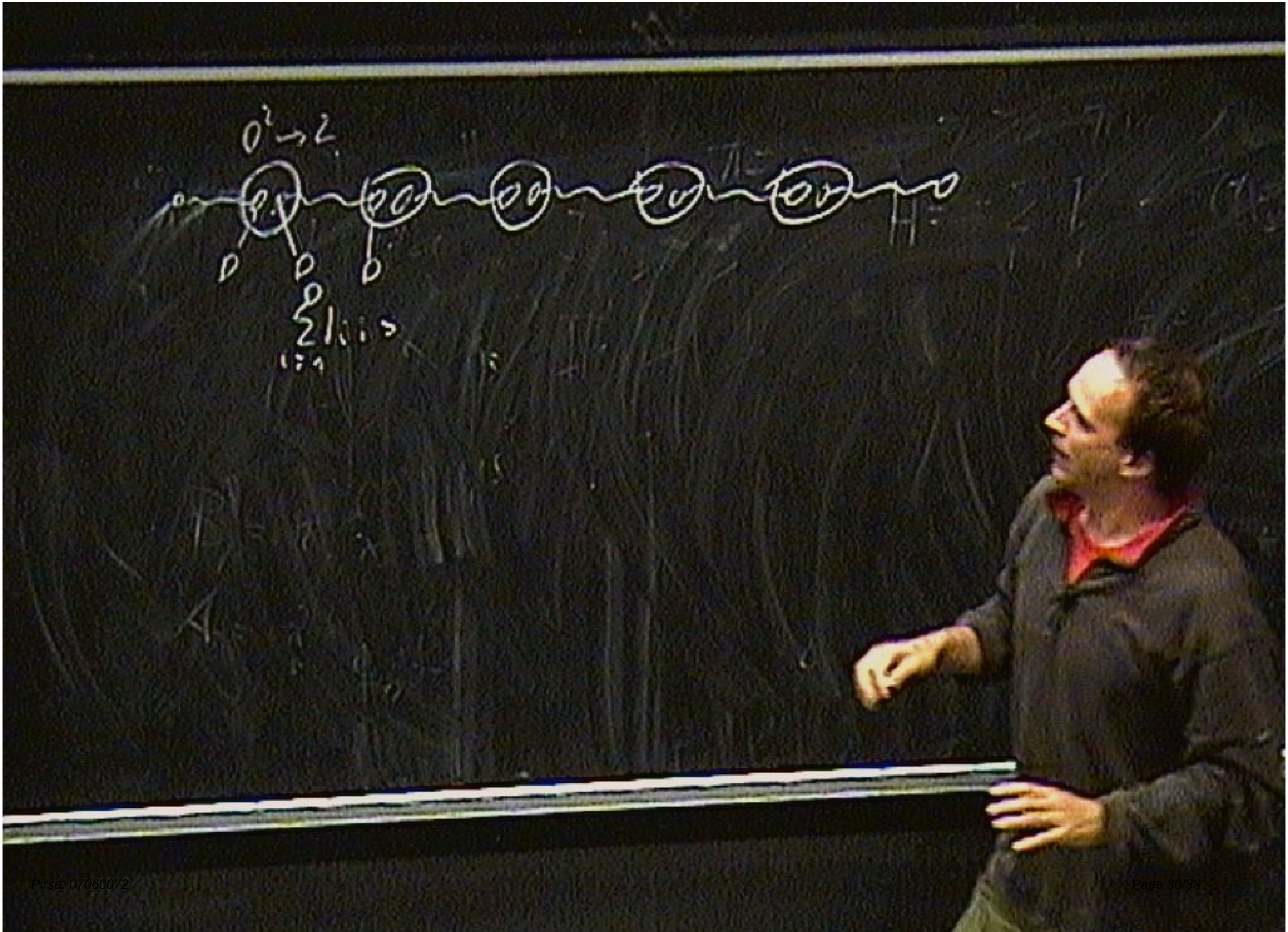


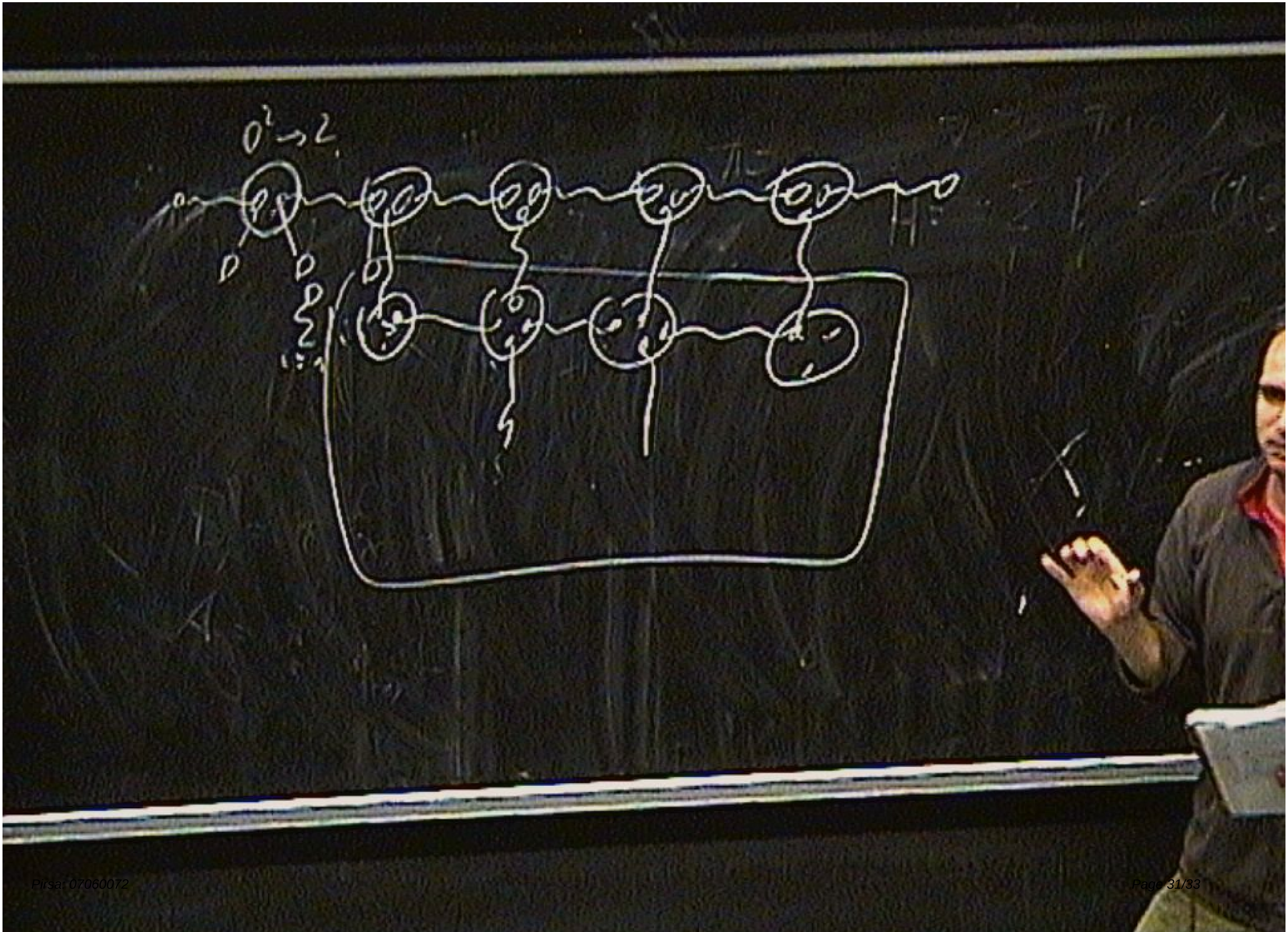
U
U
U
S_A = -Tr{ρ_A log ρ_A}
≃ L

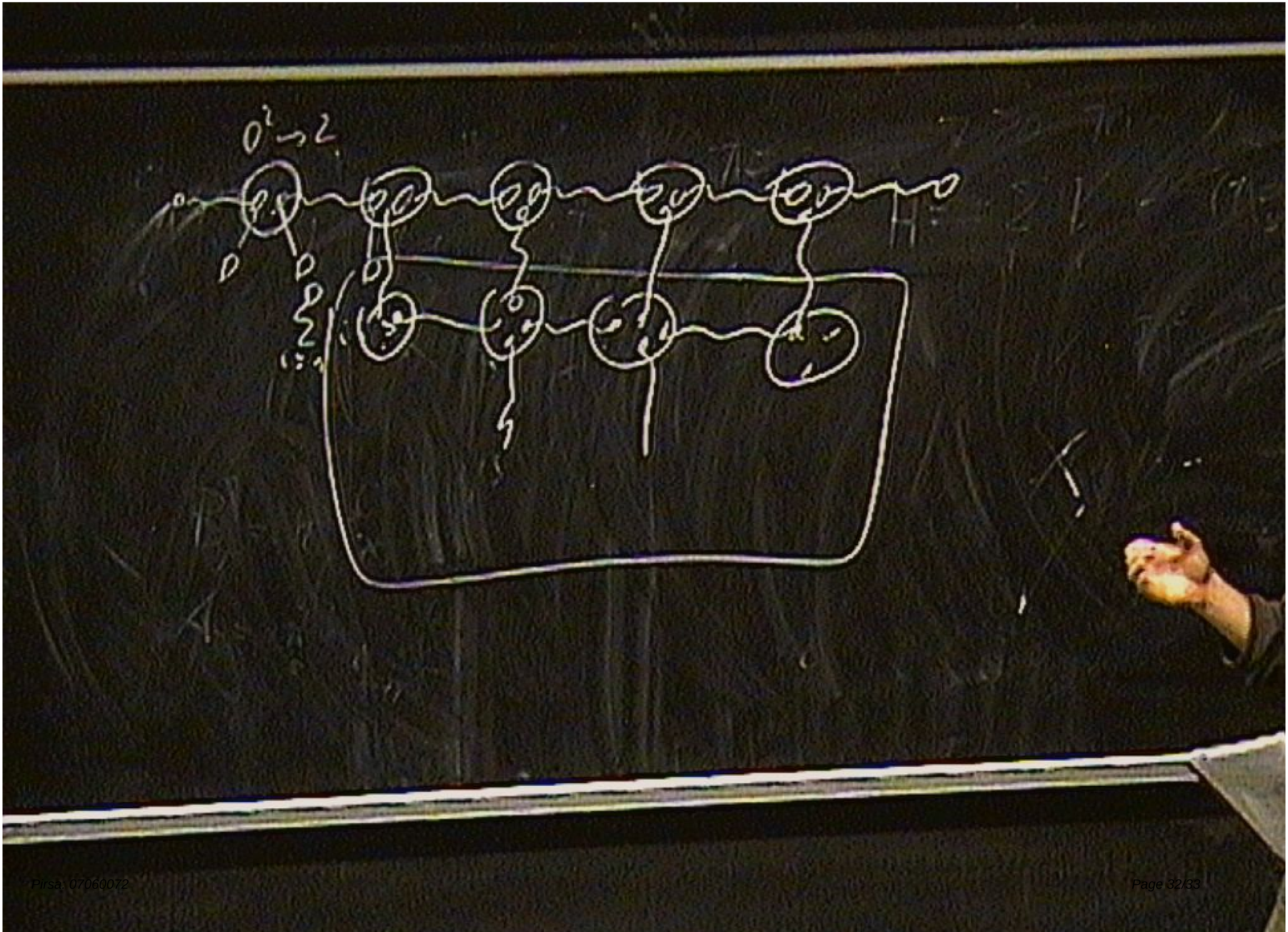

S_Λ = −Tr{ρ_Λ log ρ_Λ}
≃ L
ψ^(1)_ABC → ρ_AB ≃ ρ_A ⊗ ρ_B
ψ^(2)_ABC → ρ_AB ≃ ρ_A ⊗ ρ_B
⟹ ψ^(1) = U_C ψ^(2)
ψ_AC' ⊗ ψ_BC'

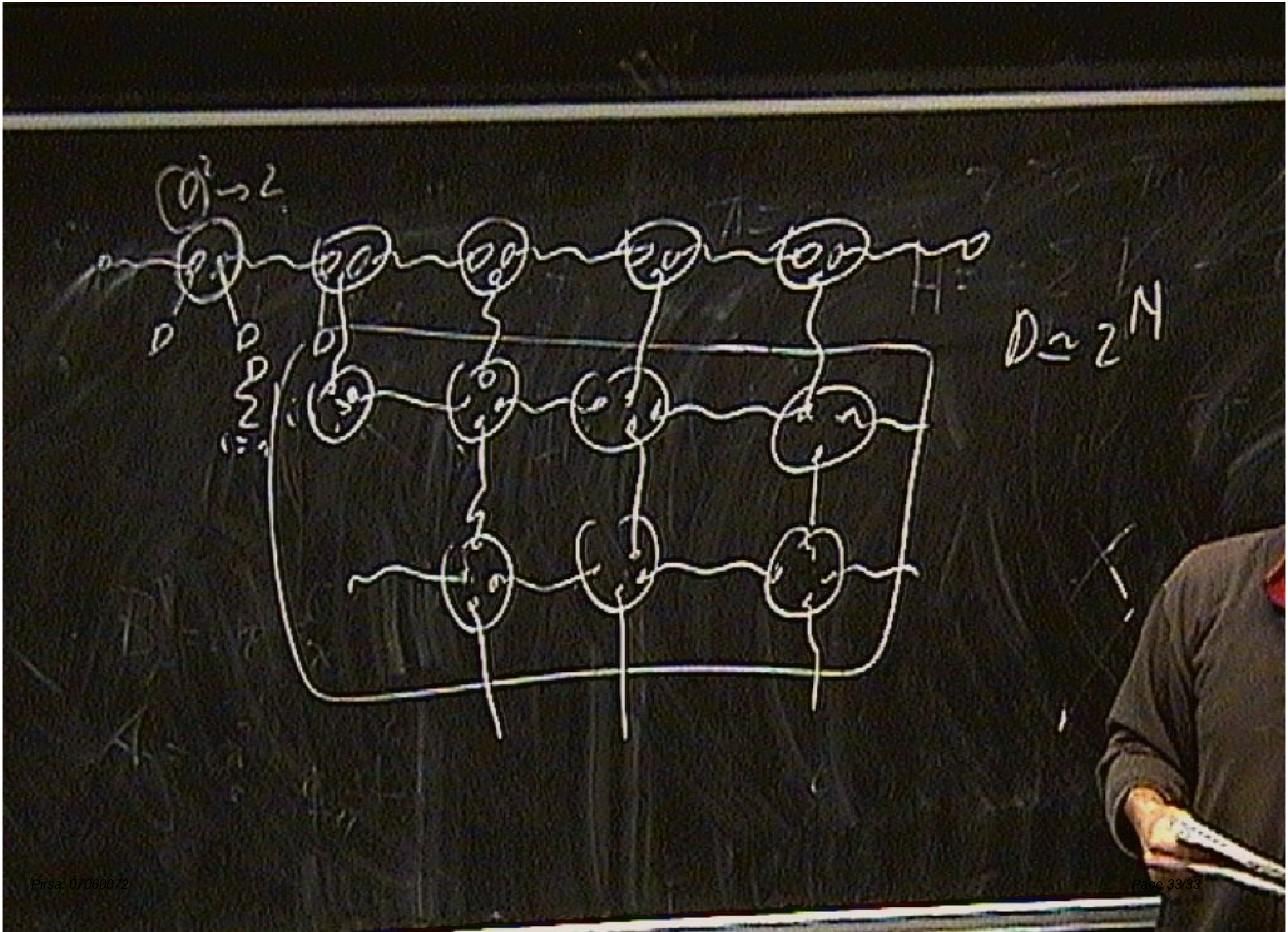

S_A = -Tr{ρ_A log ρ_A}
≃ L
ψ_{ABC} → ρ_{AB} ≃ ρ_A ⊗ ρ_B
⇒ ψ = U_C ψ










$D \simeq 2^N$