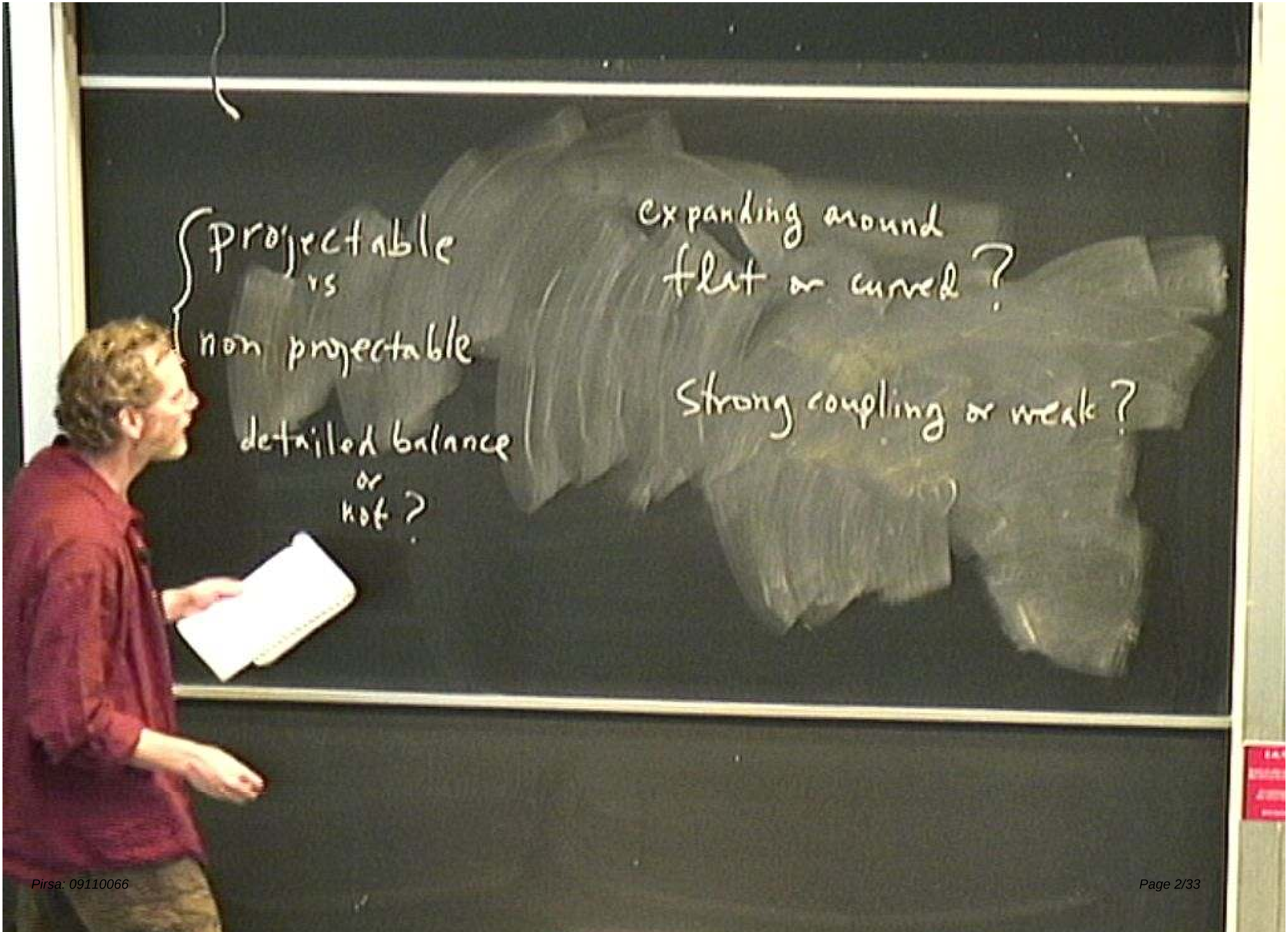
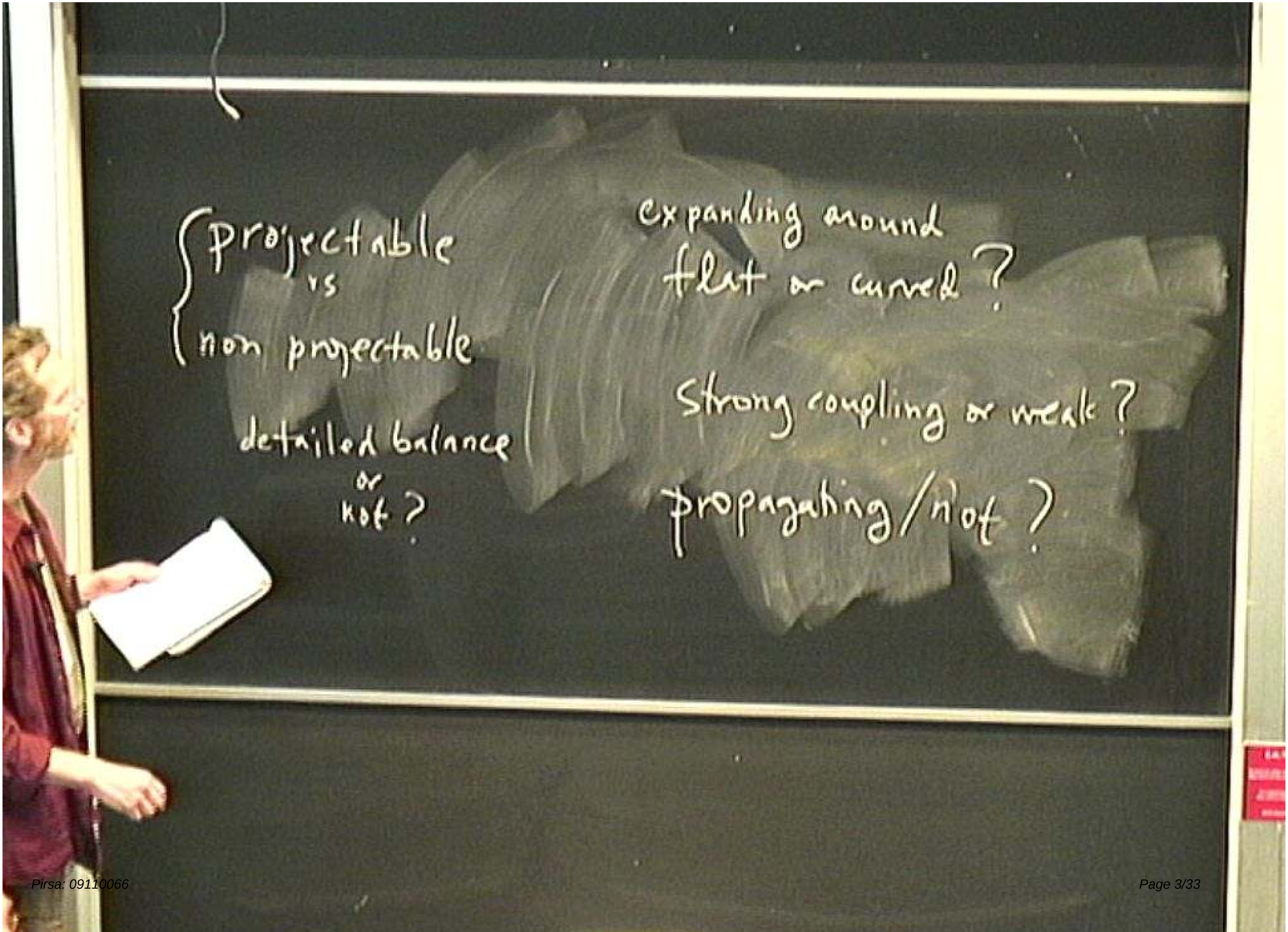
Title: Workshop Summary and Discussion

Date: Nov 10, 2009 03:00 PM

URL: http://pirsa.org/09110066

Abstract:


projectable
vs
non projectable
detailed balance
or
not ?
expanding around
flat or curved ?
Strong coupling or weak ?


projectable
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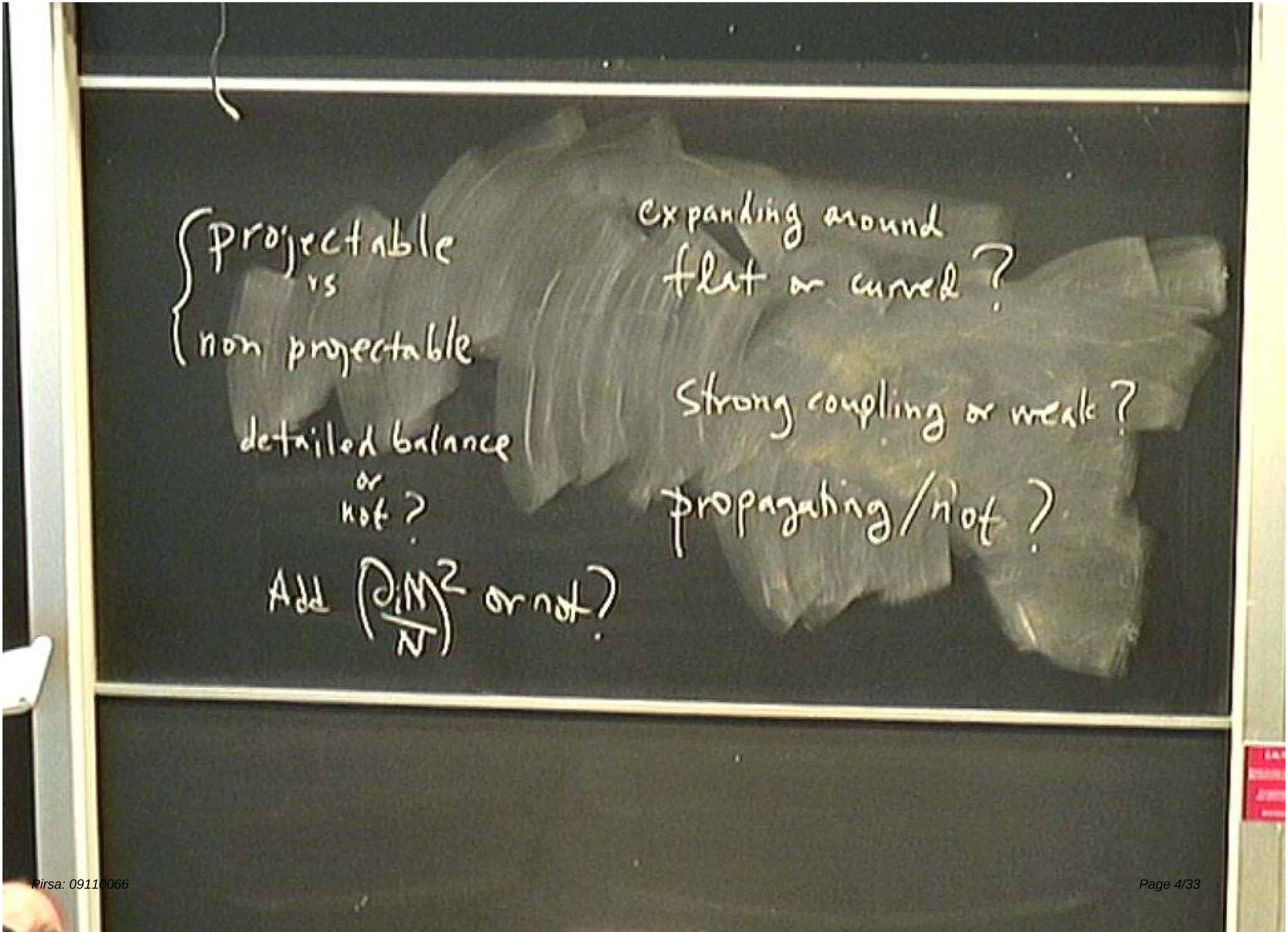
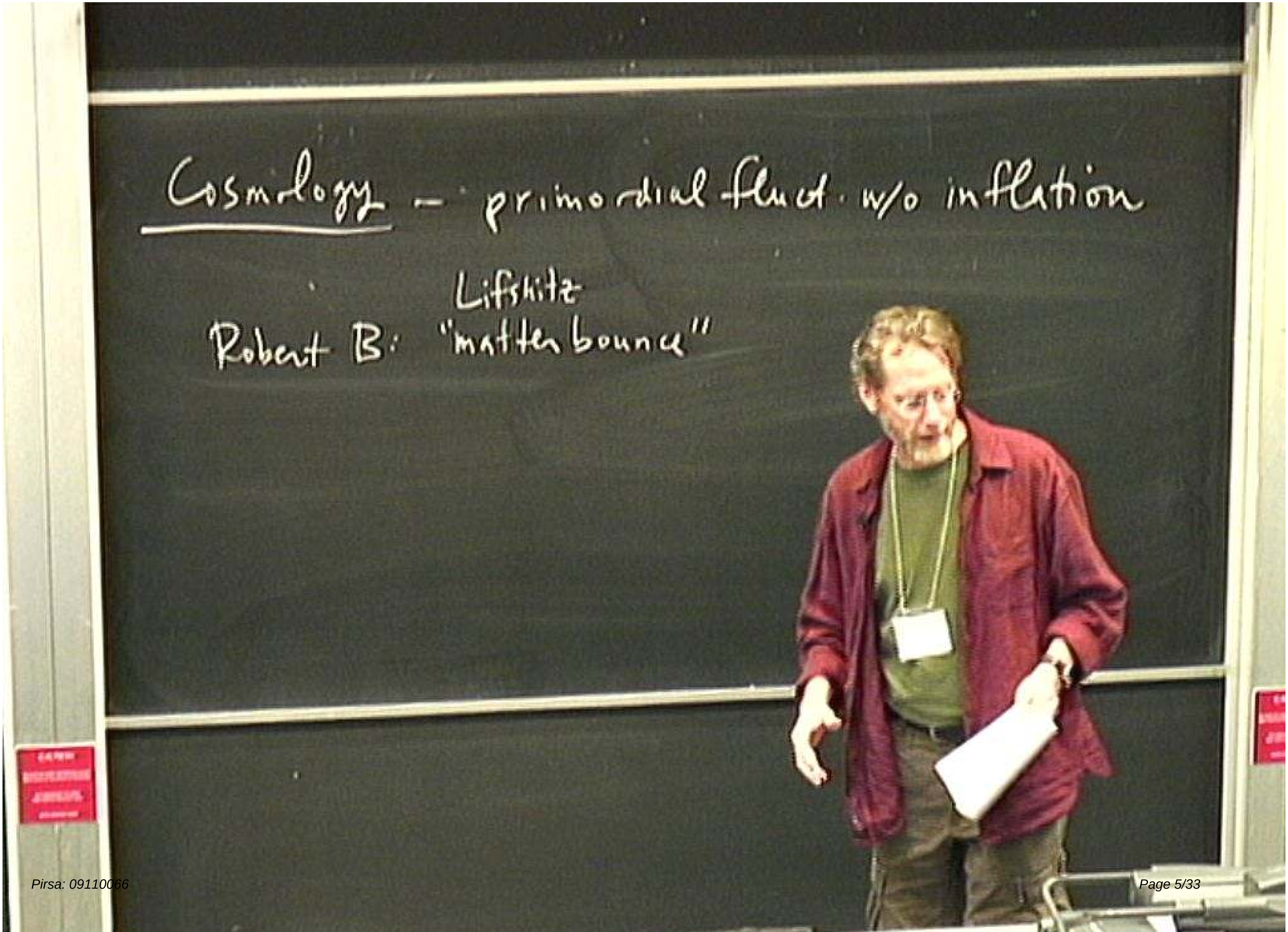
Strong coupling or weak ?
propagating / not ?


projectable vs non projectable
detailed balance or not?
Add $\left(\frac{\partial_i N}{N}\right)^2$ or not?
expanding around flat or curved?
Strong coupling or weak?
propagating/not?


Cosmology – primordial fluct. w/o inflation
Lifshitz
Robert B: "matter bounce"

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Lifshitz

Robert B: "matter bounce" – scale inv. by amplif.
of longer wavelengths
"by accident" scale inv.
if matter dominated

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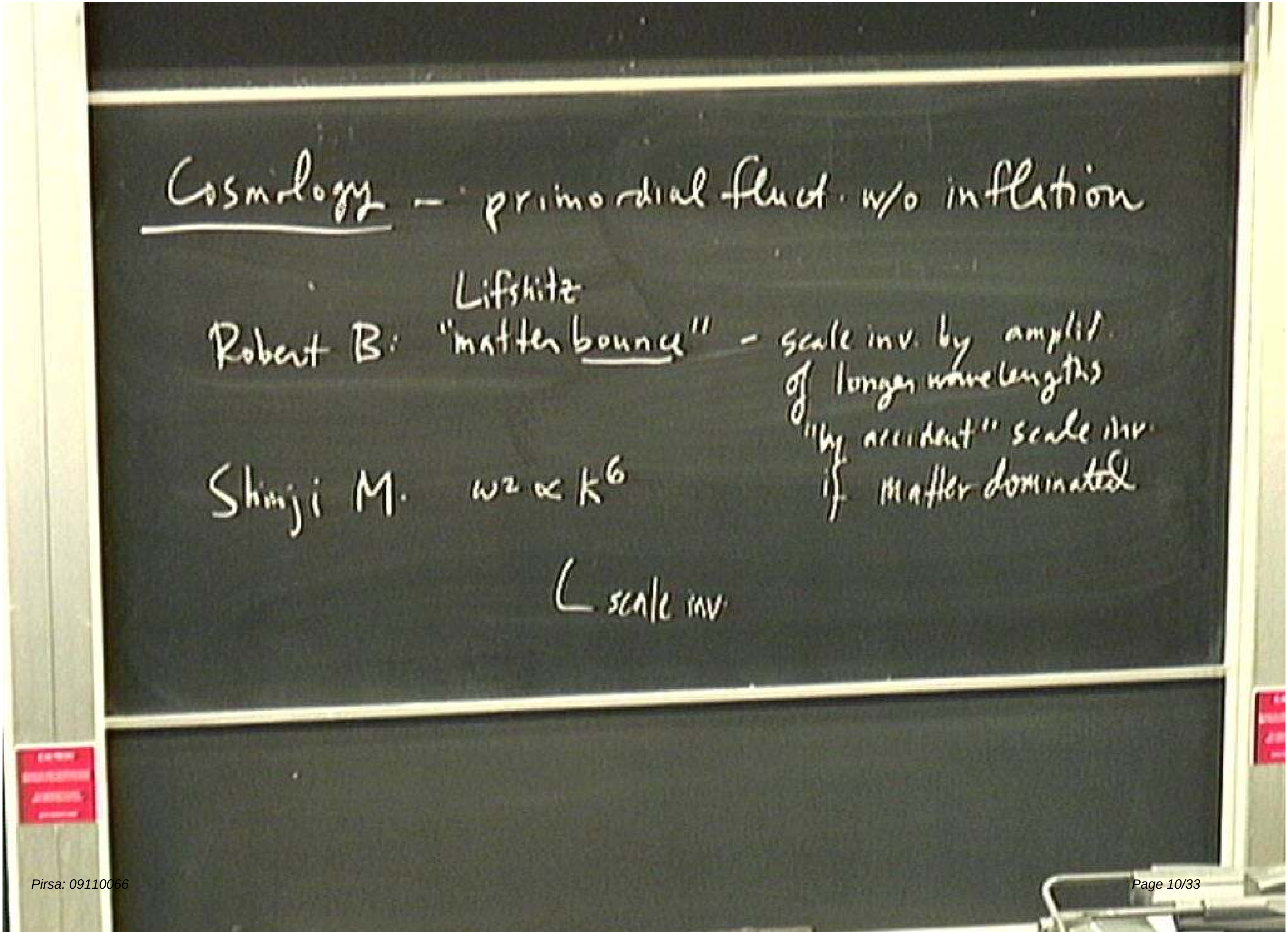
"by accident" scale inv. if matter dominated

Shinji M. $\omega^2 \propto k^6$


Cosmology – primordial fluct. w/o inflation
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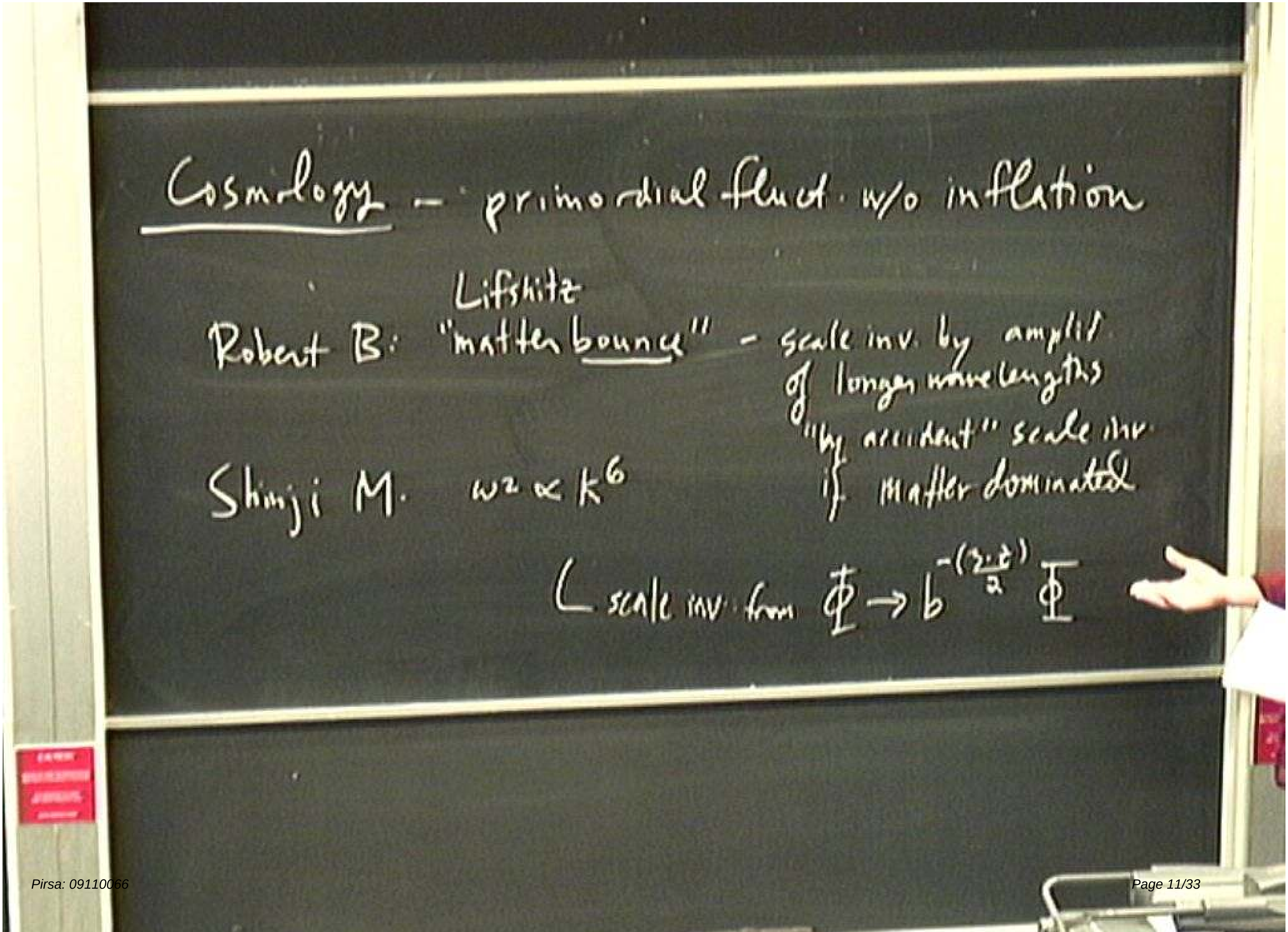
Robert B: "matter bounce" – scale inv. by amplif. of longer wavelengths
"by accident" scale inv. if matter dominated
Shinji M. ω² ∝ k⁶
↳ scale inv.


Cosmology – primordial fluct. w/o inflation
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Shinji M. $\omega^2 \propto k^6$
$\mathcal{L}$ scale inv. from $\Phi \to b^{-\frac{(2-z)}{2}} \Phi$

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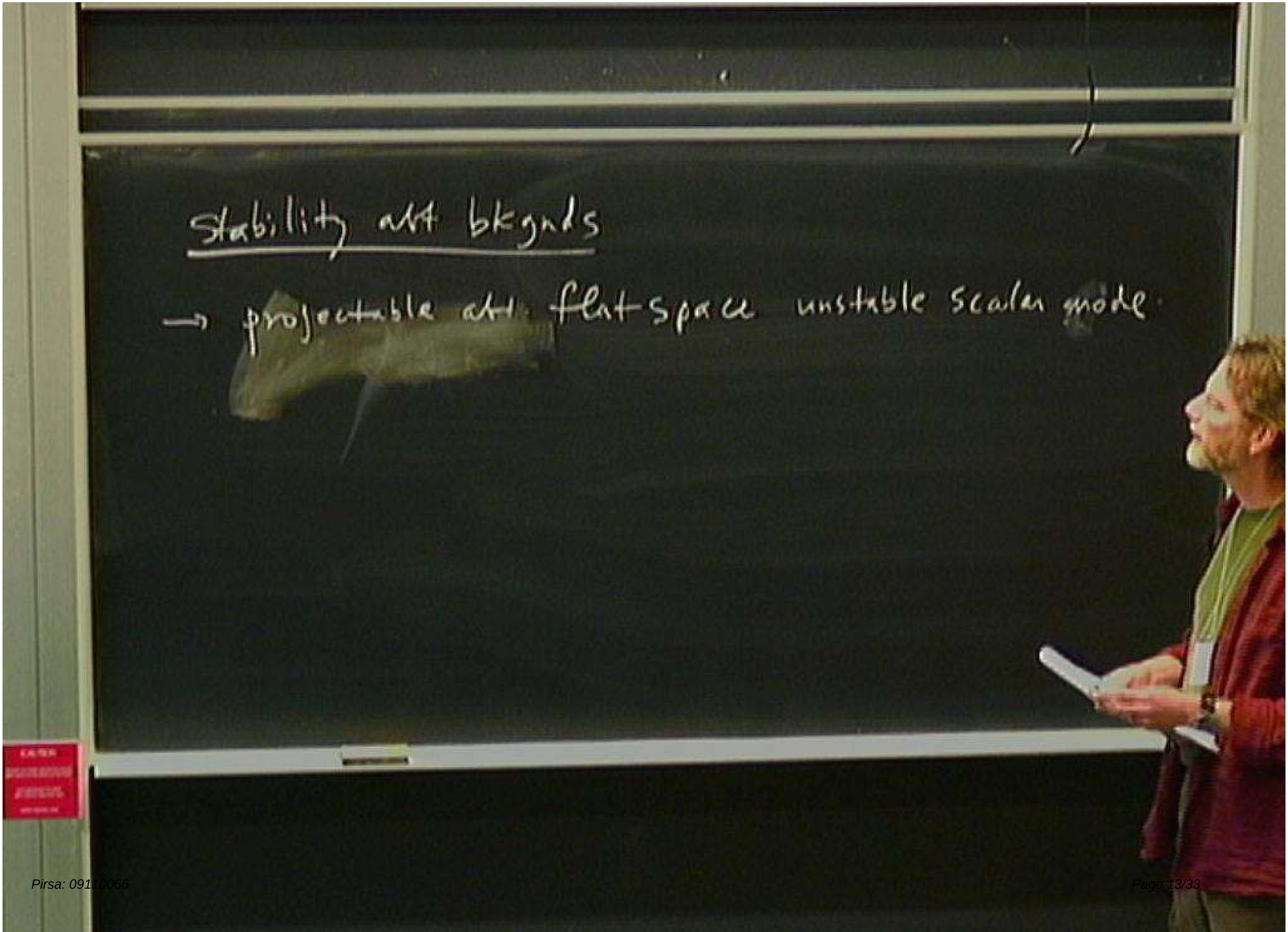
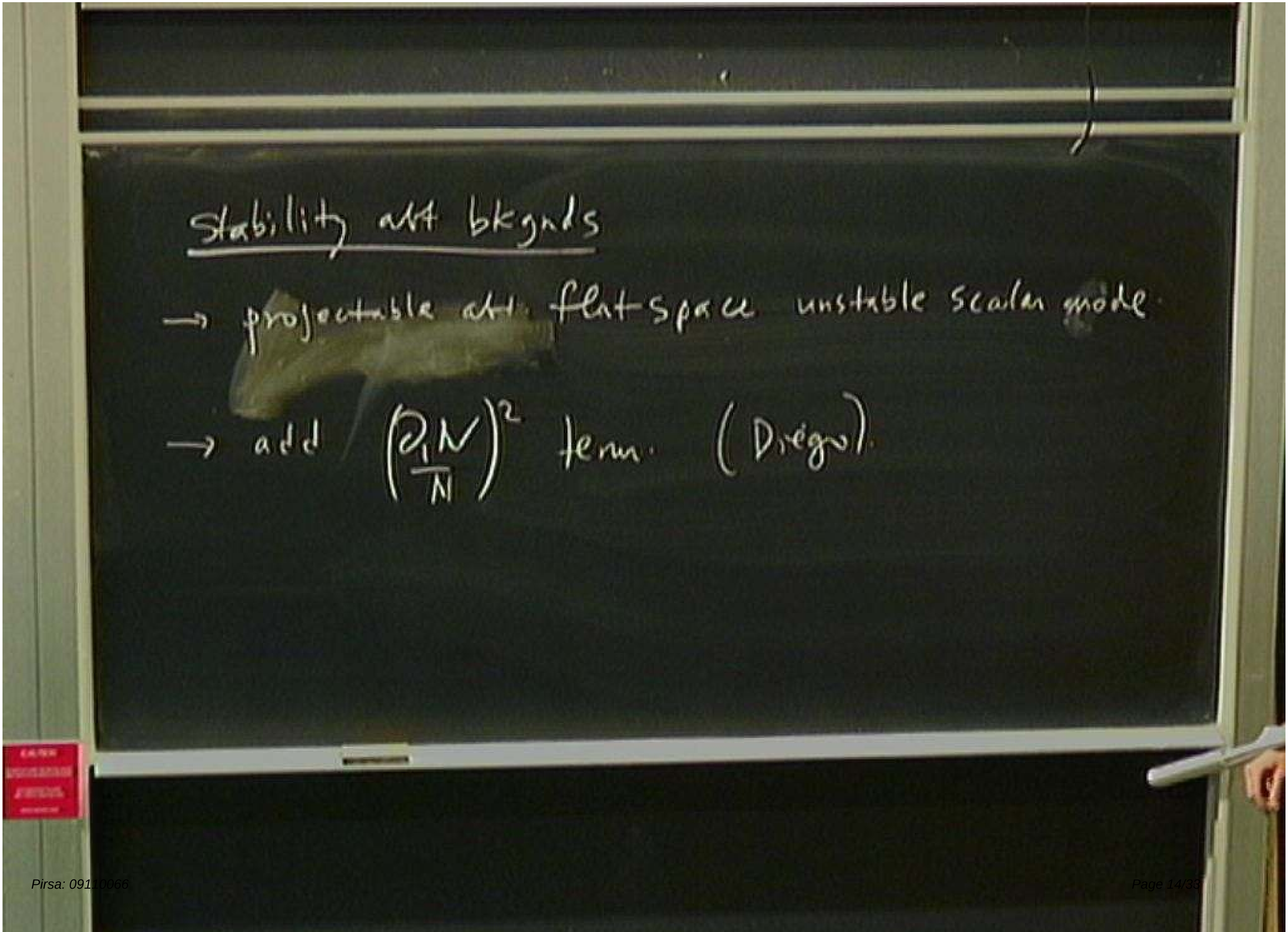
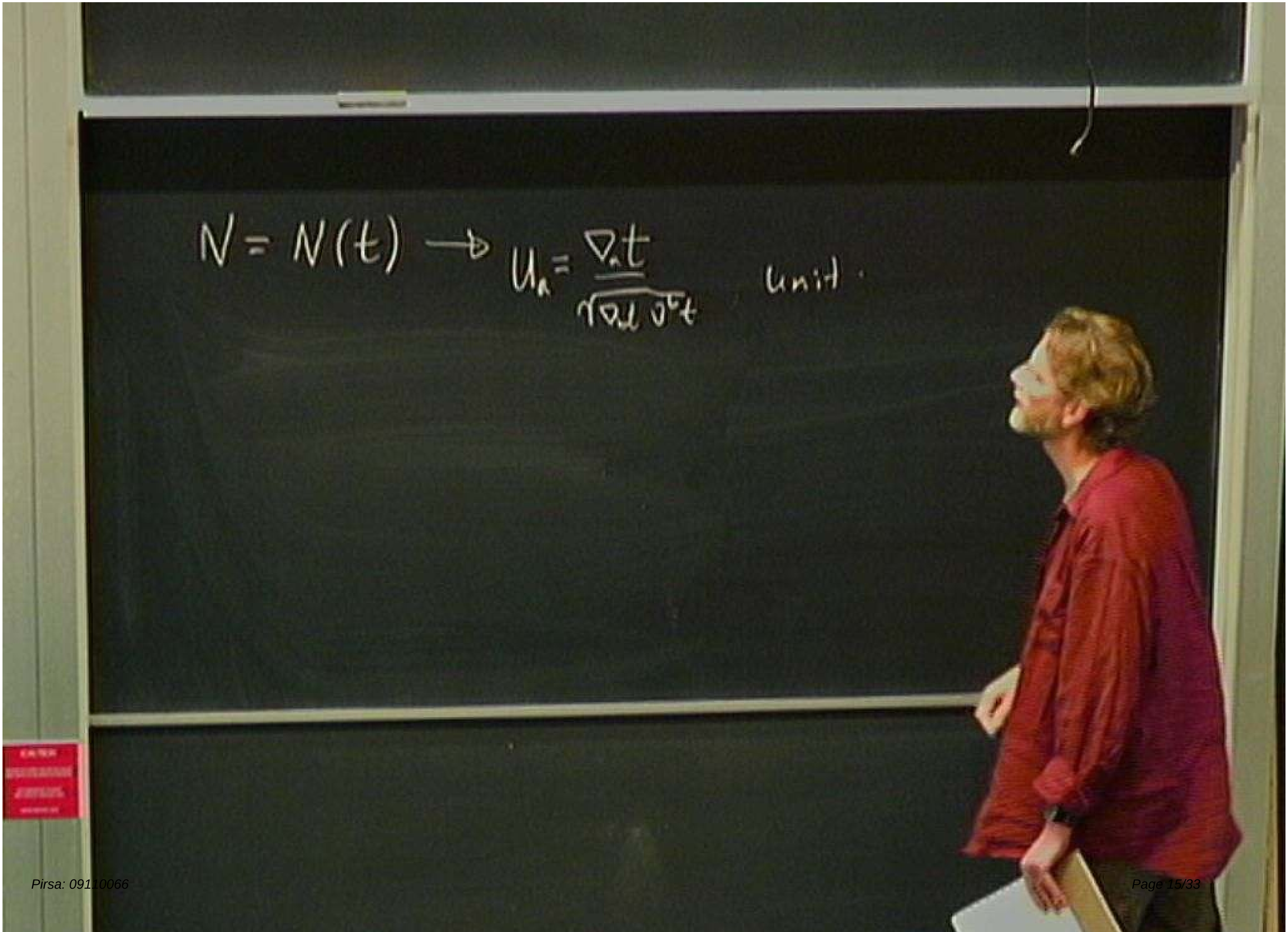
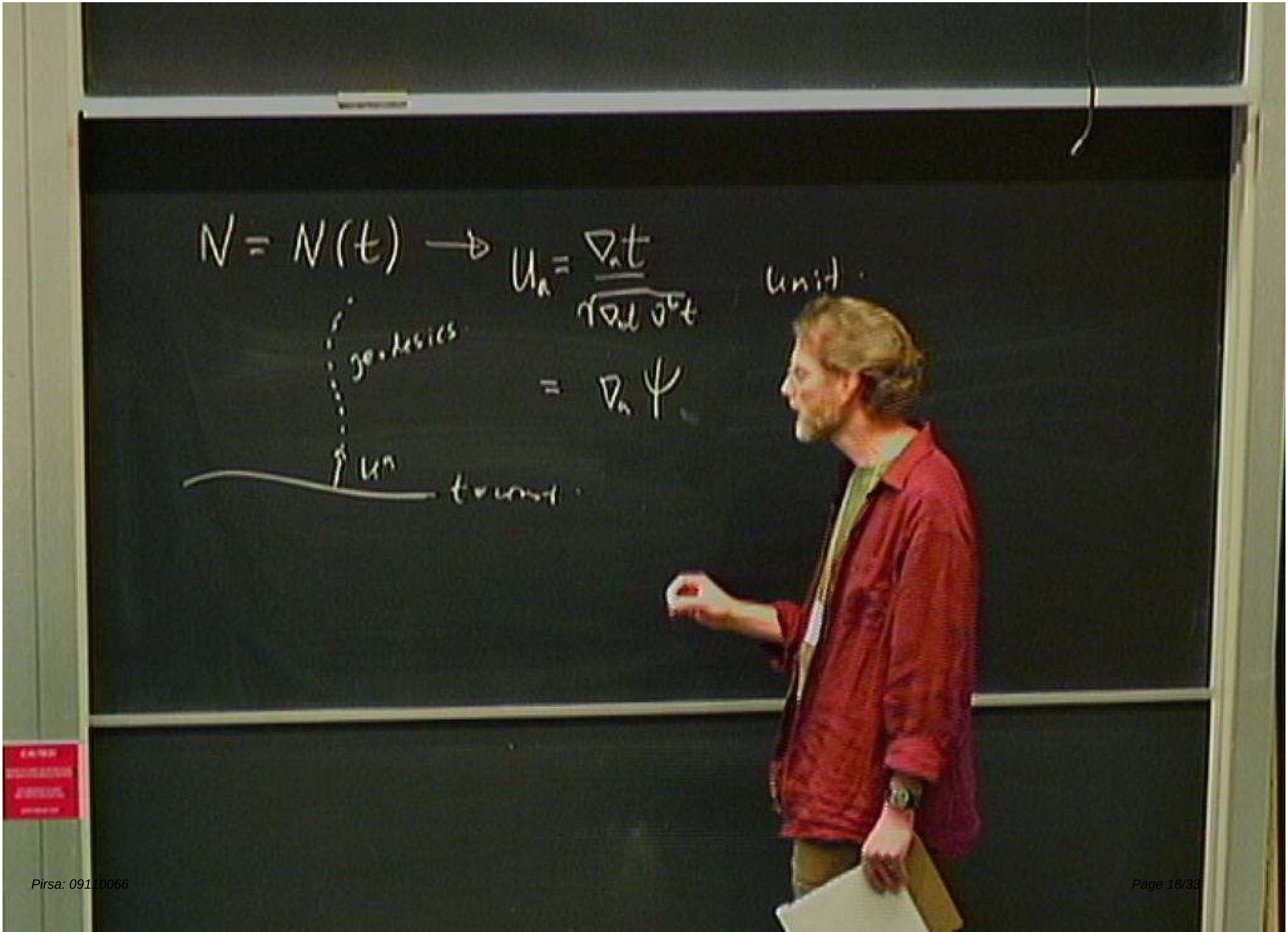
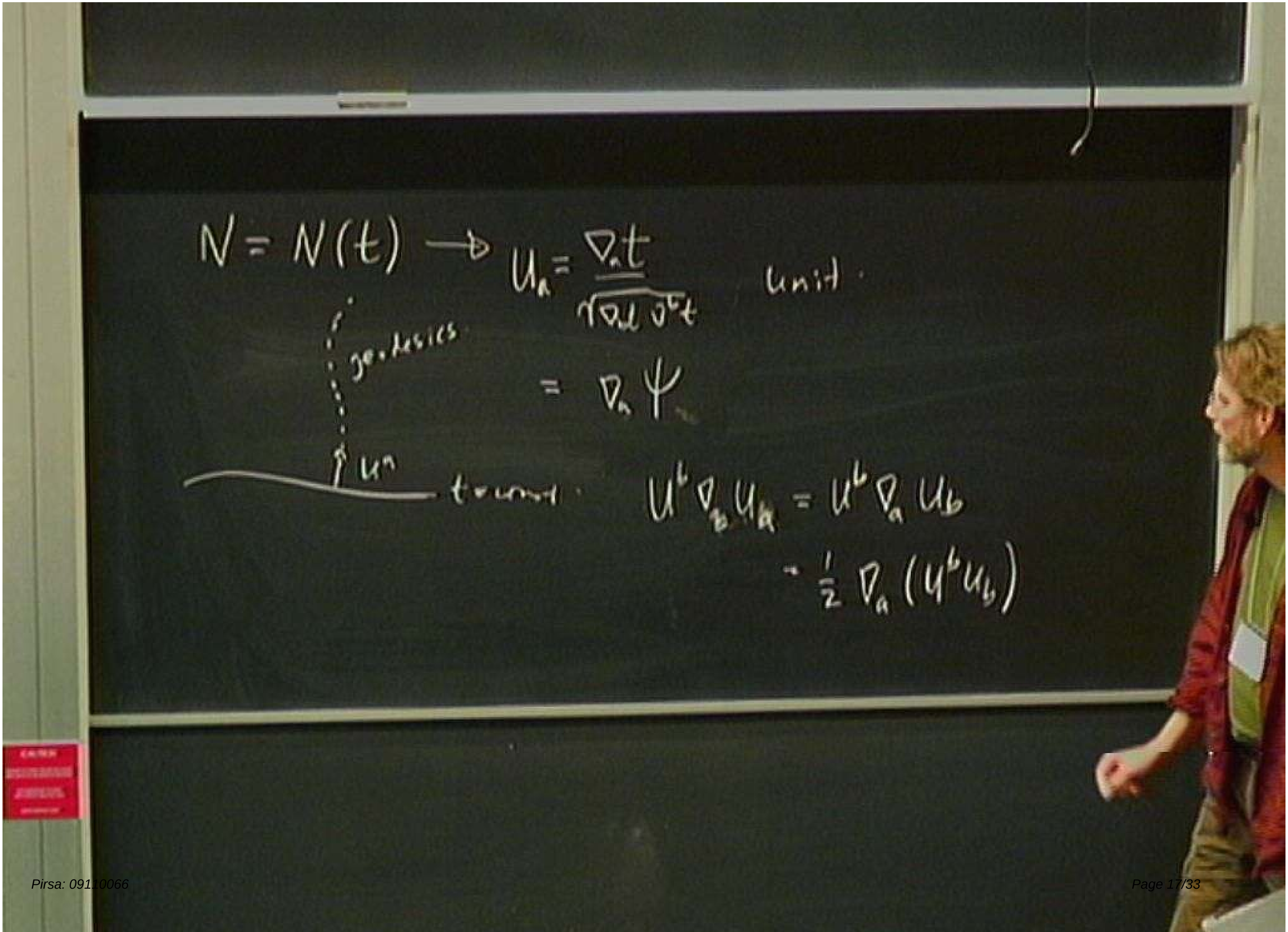

Stability abt bkgnds
→ projectable abt flat space unstable scalar mode

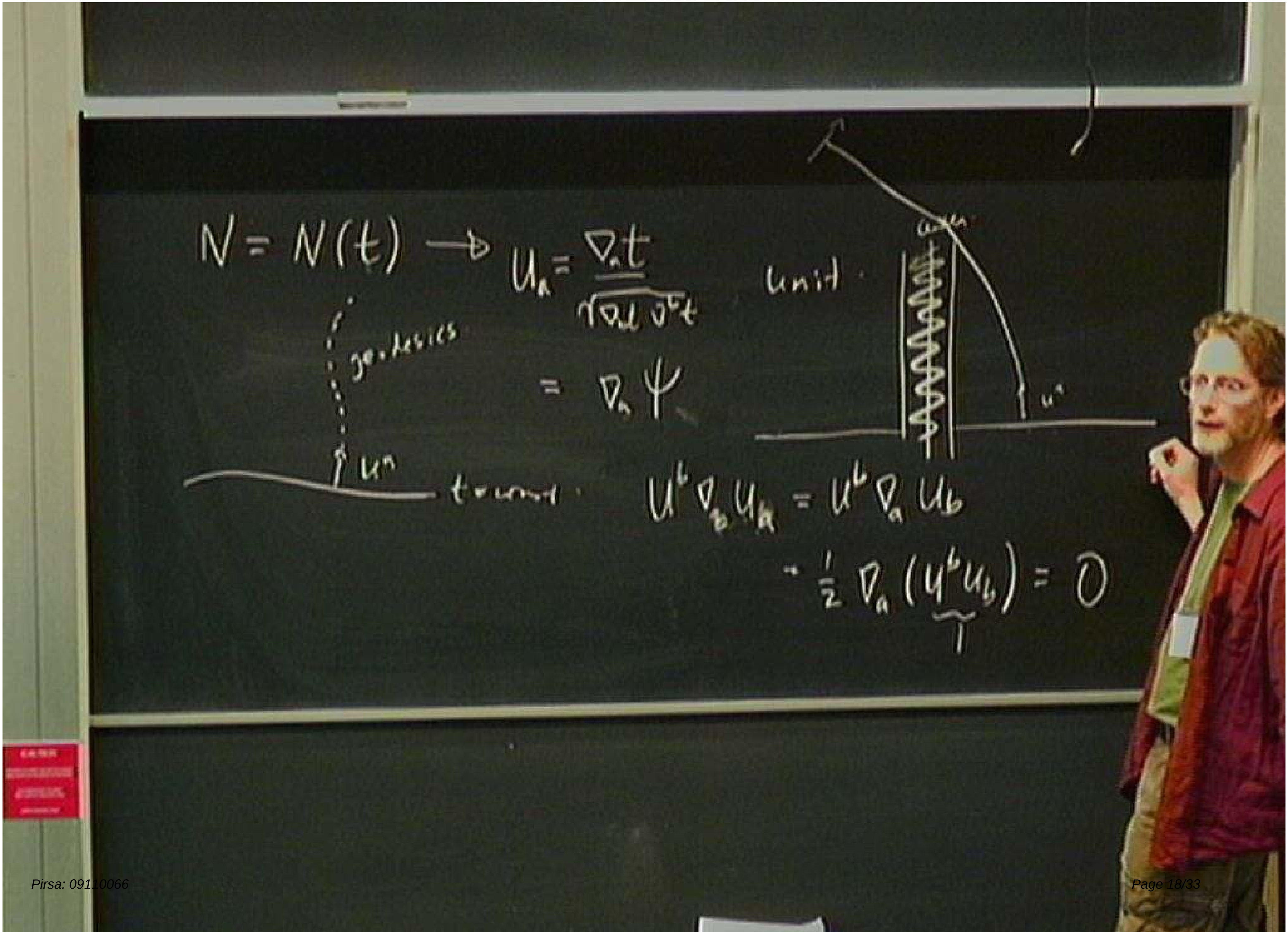

Stability abt bkgnds
→ projectable abt flat-space unstable scalar mode.
→ add $\left(\frac{\partial_i N}{N}\right)^2$ term. (Diego)

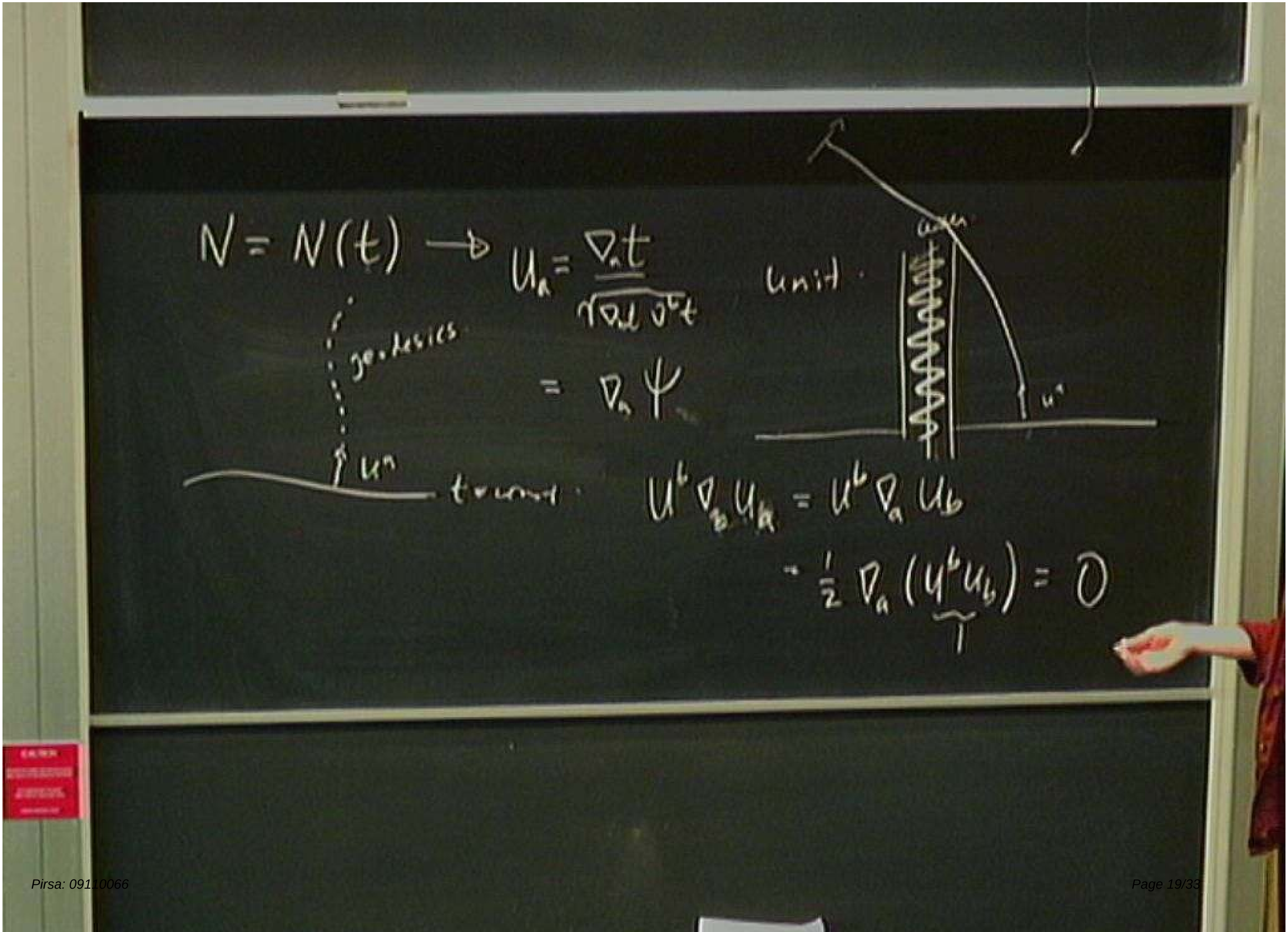

N = N(t) → u_a = ∇_a t / √(∇_a t ∇^a t)
unit

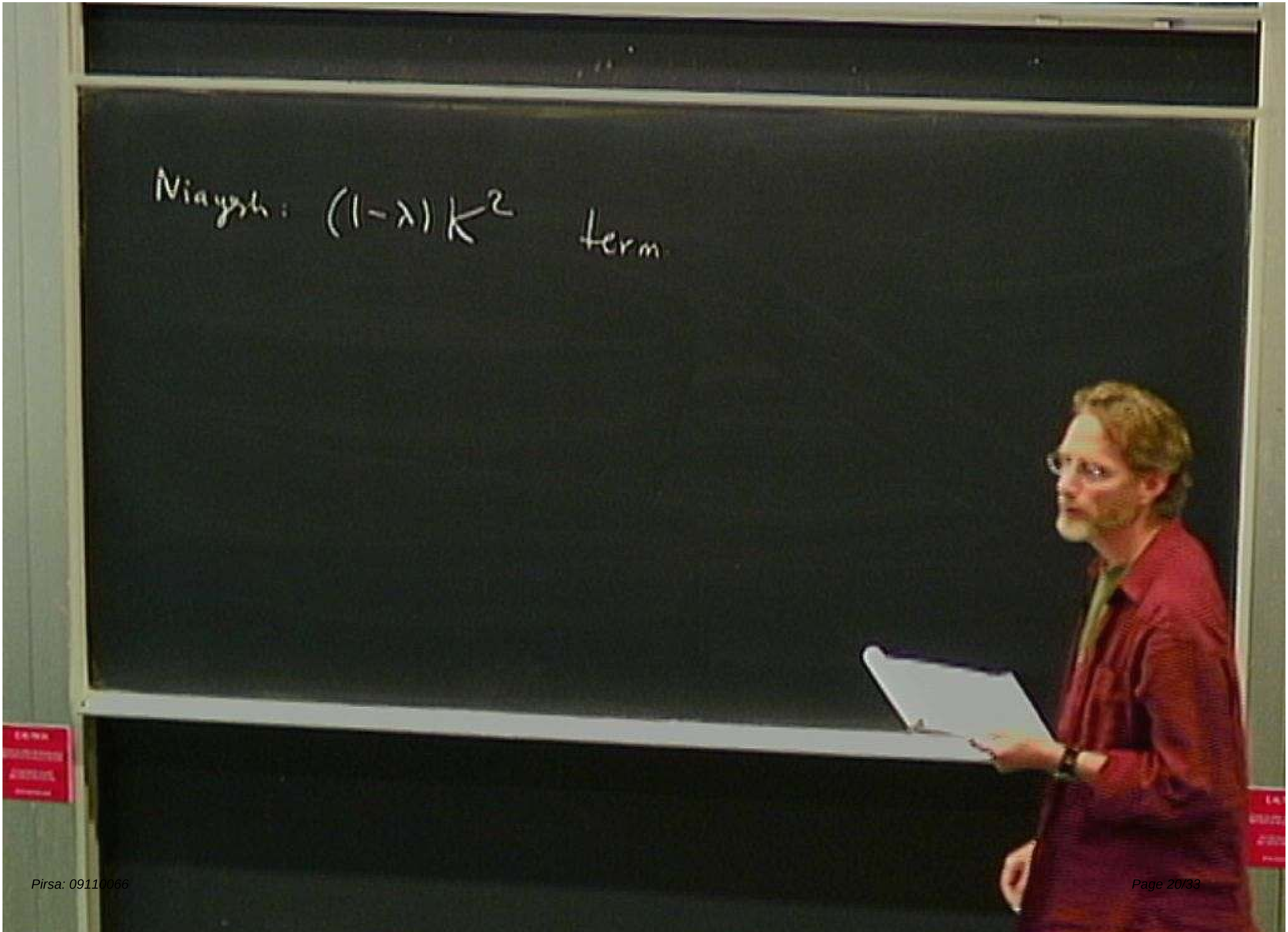

N = N(t) → u_n = ∇_n t / √(∇_n t ∇^n t)
unit
= ∇_n ψ
geodesics
u^n
t = const



$N = N(t) \rightarrow u_a = \frac{\nabla_a t}{\sqrt{\nabla_a t \nabla^a t}}$
unit.
geodesics
$= \nabla_a \psi$
u^a
$t = \text{const.}$
$u^b \nabla_b u_a = u^b \nabla_a u_b$
$= \frac{1}{2} \nabla_a (u^b u_b)$


N = N(t) →
u_a = ∇_a t / √(∇_a t ∇^a t)
= ∇_a ψ
geodesics
unit
t = const
u^b ∇_b u_a = u^b ∇_a u_b
= 1/2 ∇_a (u^b u_b) = 0


N = N(t) → u_a = ∇_a t / √(∇_a t ∇^a t)
= ∇_a ψ
geodesics
unit
u^a
u^b ∇_b u_a = u^b ∇_a u_b
= ½ ∇_a (u^b u_b) = 0


Niaysh: (1-λ) K^2 term

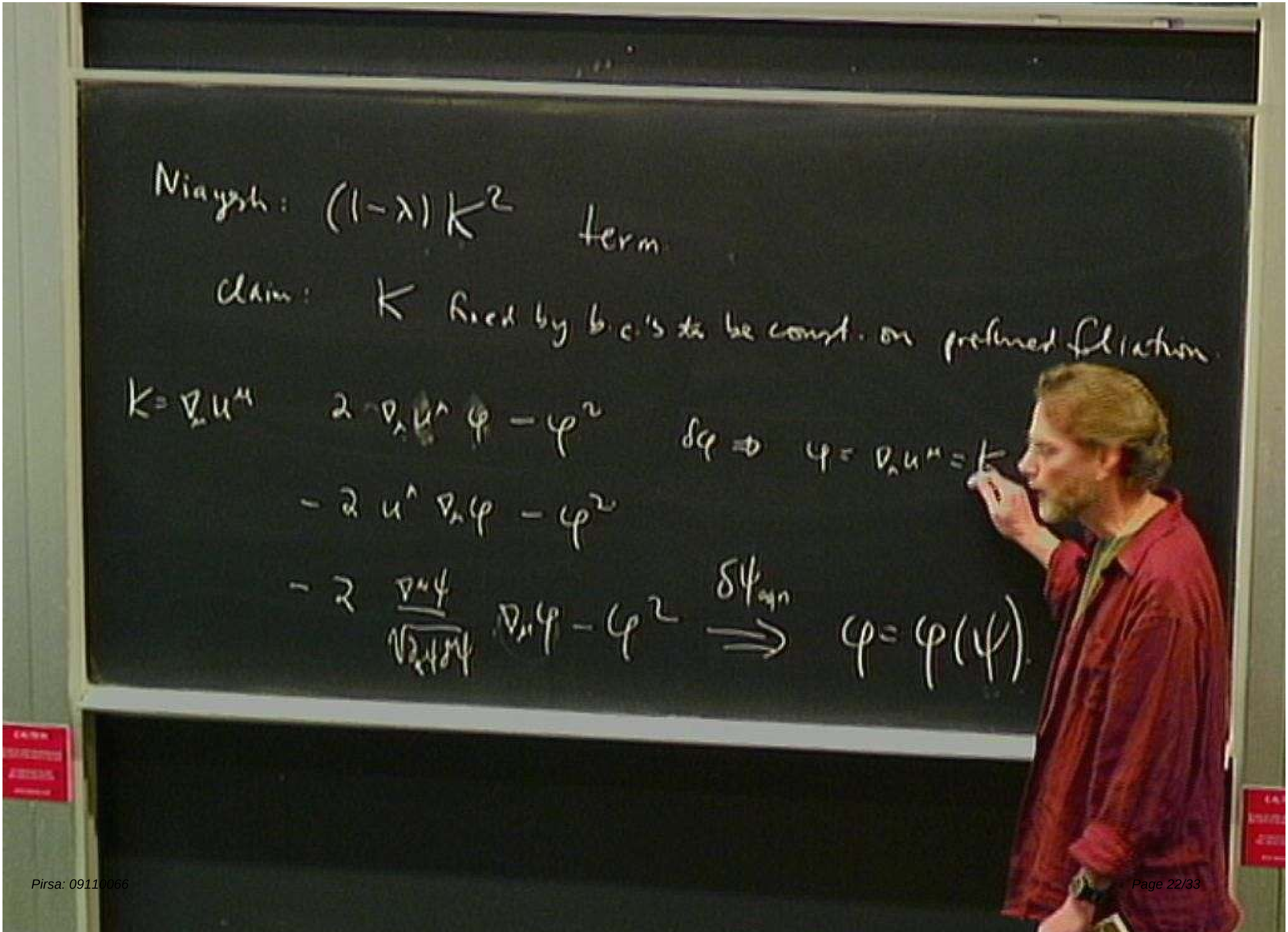
Niayesh: $(1-\lambda) K^2$ term

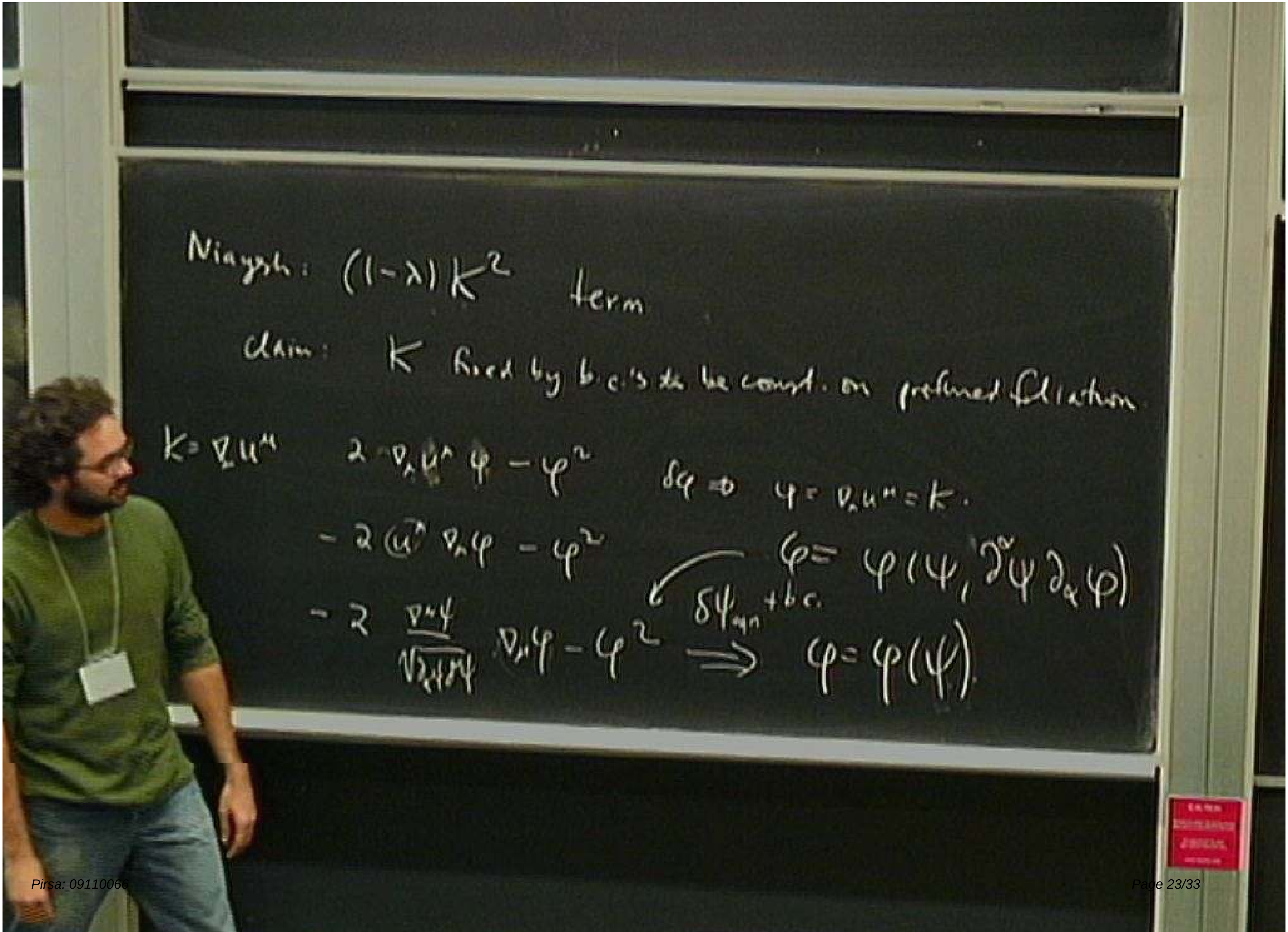
Claim: K fixed by b.c.'s to be const. on preferred foliation.

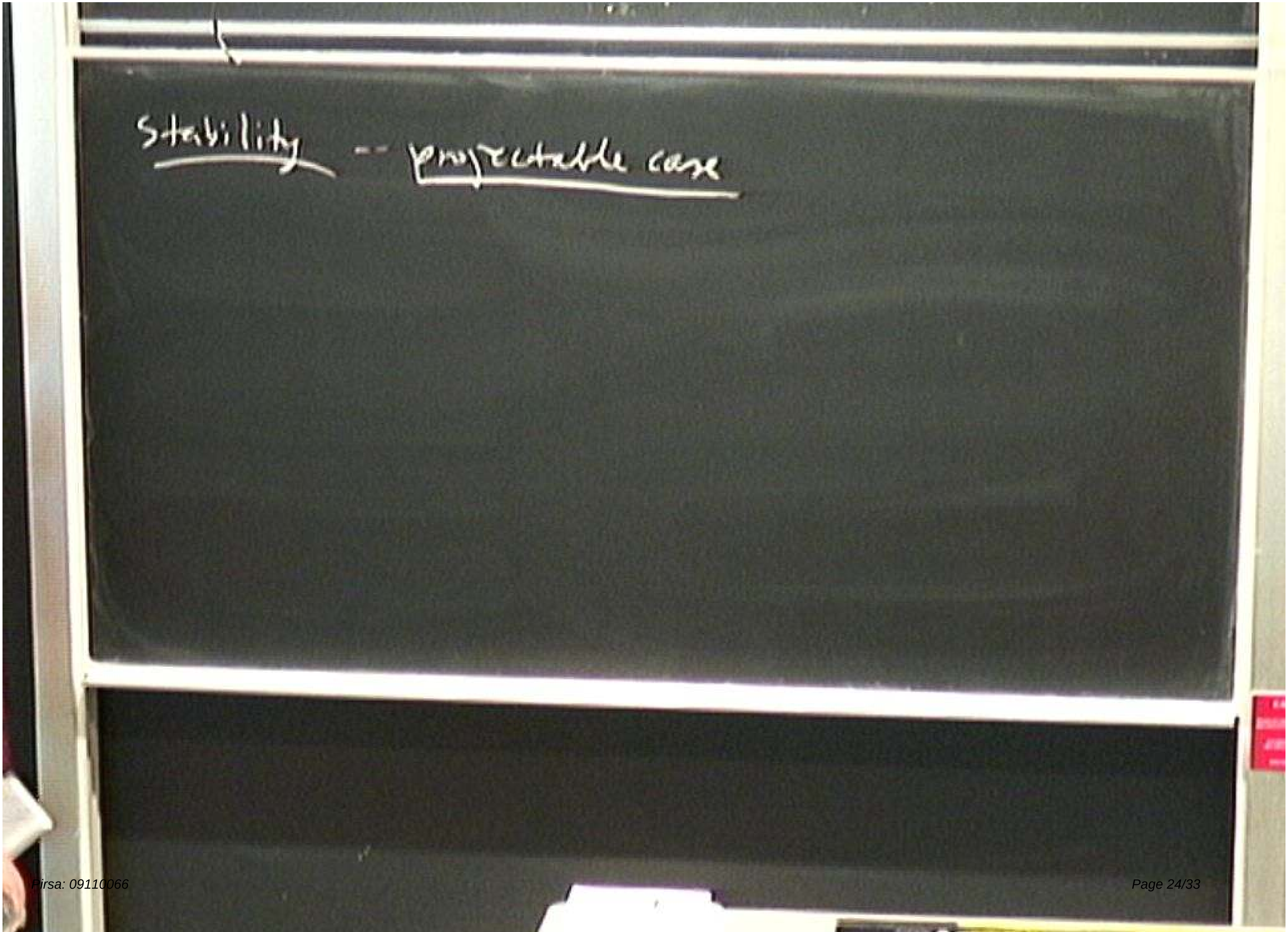
$K = \nabla_\mu u^\mu$ $\quad 2 \nabla_\mu u^\mu \varphi - \varphi^2$ $\quad \delta\varphi \Rightarrow \varphi = \nabla_\mu u^\mu = K$.

$- 2 u^\mu \nabla_\mu \varphi - \varphi^2$

$- 2 \frac{\nabla^\mu \psi}{\sqrt{\nabla_\nu \psi \nabla^\nu \psi}} \nabla_\mu \varphi - \varphi^2$


Niayesh: (1-λ) K^2 term
claim: K fixed by b.c.'s to be const. on preferred foliation
K = ∇_μ u^μ
2 ∇_μ u^μ φ − φ^2
δφ ⇒ φ = ∇_μ u^μ = K
− 2 u^μ ∇_μ φ − φ^2
− 2 ∇^μ ψ / √(∇_ν ψ ∇^ν ψ) ∇_μ φ − φ^2
δψ_eqn ⟹ φ = φ(ψ)


Niayesh: (1-λ) K² term
claim: K fixed by b.c.'s to be const. on preferred foliation
K = ∇μ u^μ
2 ∇μ u^μ φ − φ²
δφ ⇒ φ = ∇μ u^μ = K.
− 2 u^μ ∇μ φ − φ²
φ = φ(ψ, ∂^α ψ ∂α φ)
δψ eqn + b.c.
− 2 ∇^μ ψ / √(∇α ψ ∇^α ψ) ∇μ φ − φ²
⟹ φ = φ(ψ)


Stability -- projectable case

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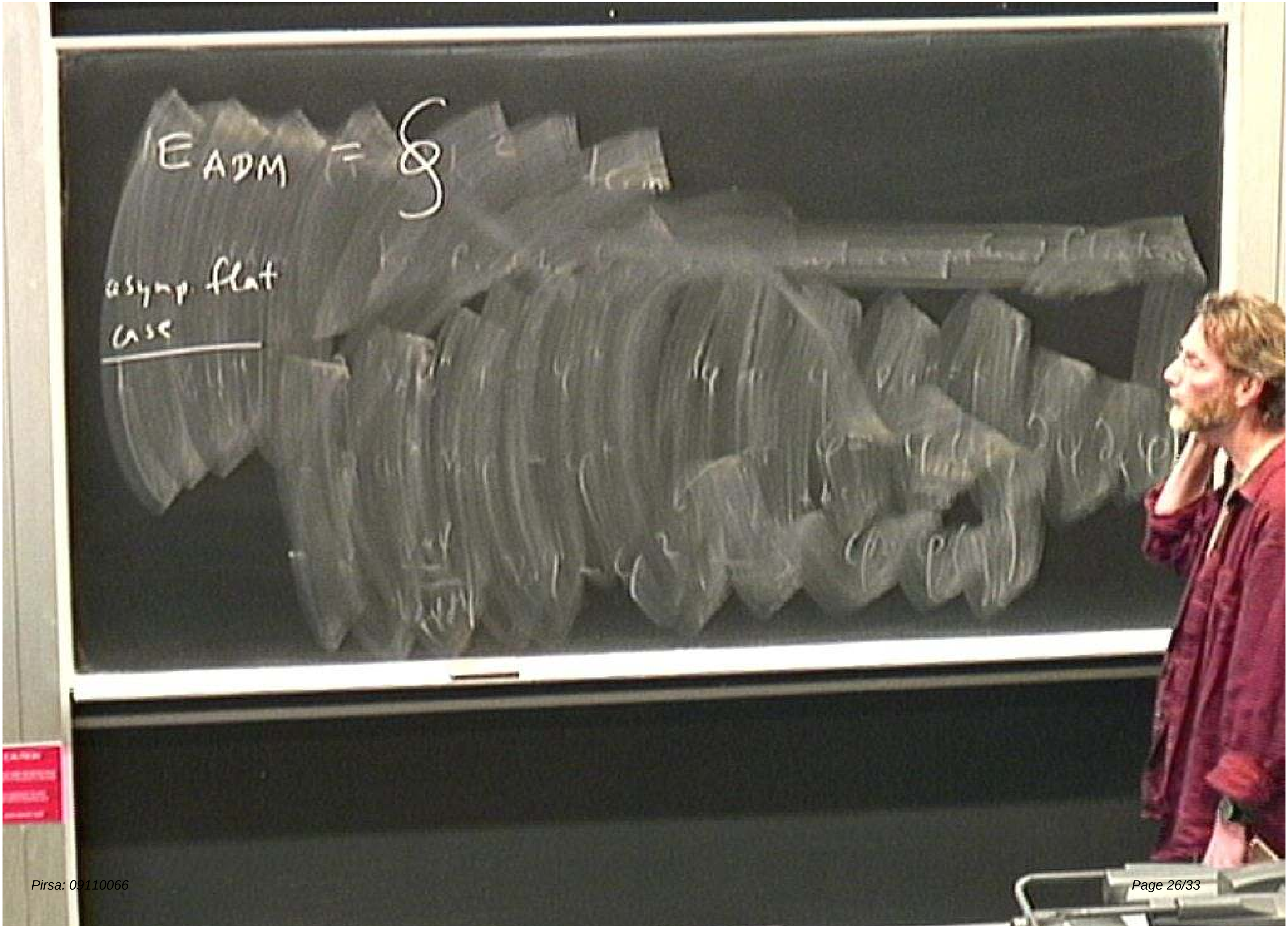
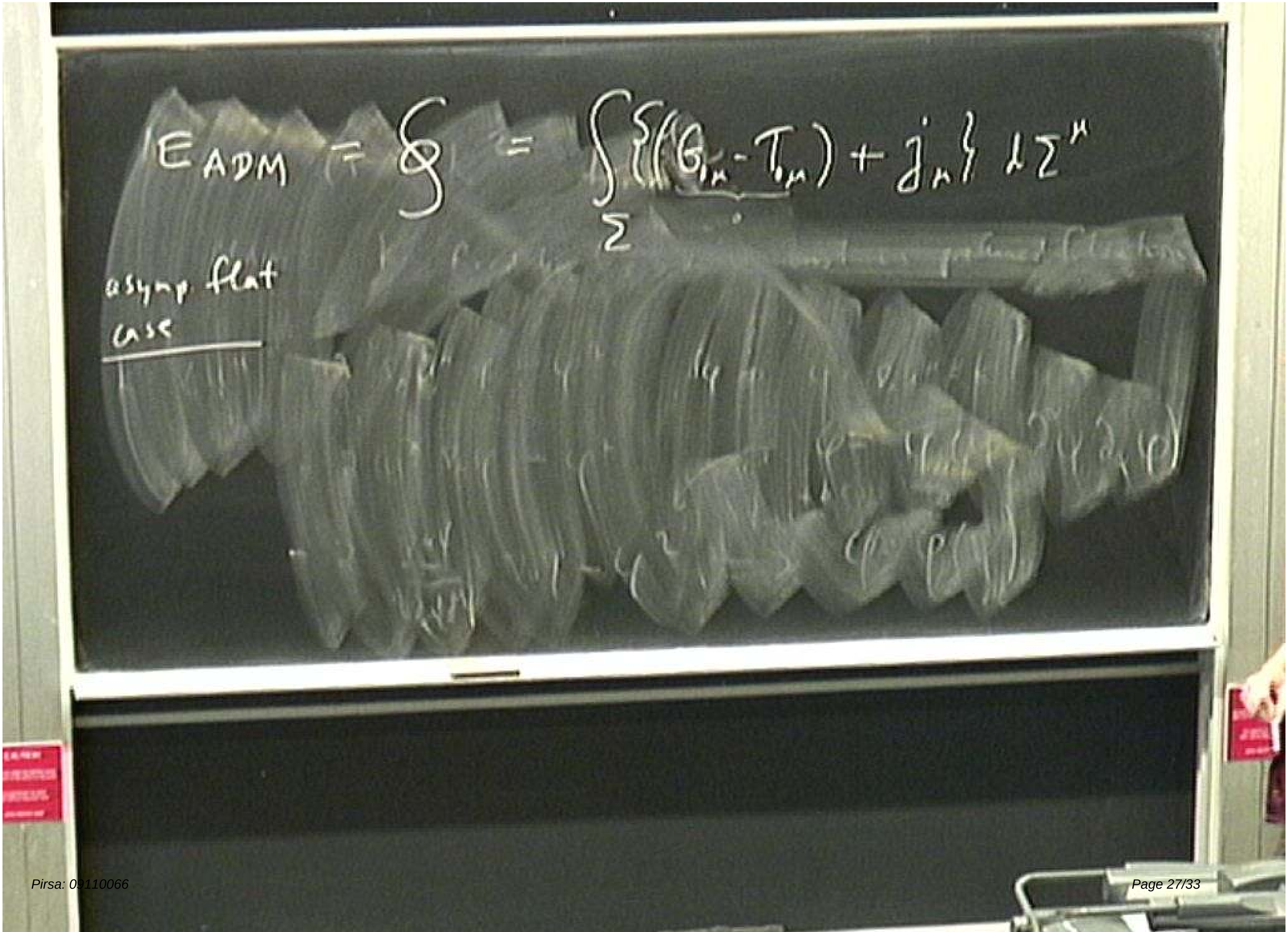
Scalar constraint dropped, preferred time

$\longrightarrow$ true hamiltonian   no "problem of time".


E ADM = ∮
asymp. flat
case


$E_{ADM} = \oint = \int_\Sigma \{(G_{0\mu} - T_{0\mu}) + j_\mu\} d\Sigma^\mu$
asymp. flat case

$$E_{ADM} = \oint = \int_\Sigma \{(\Theta_{0\mu} - T_{0\mu}) + j_\mu\} \, d\Sigma^\mu$$

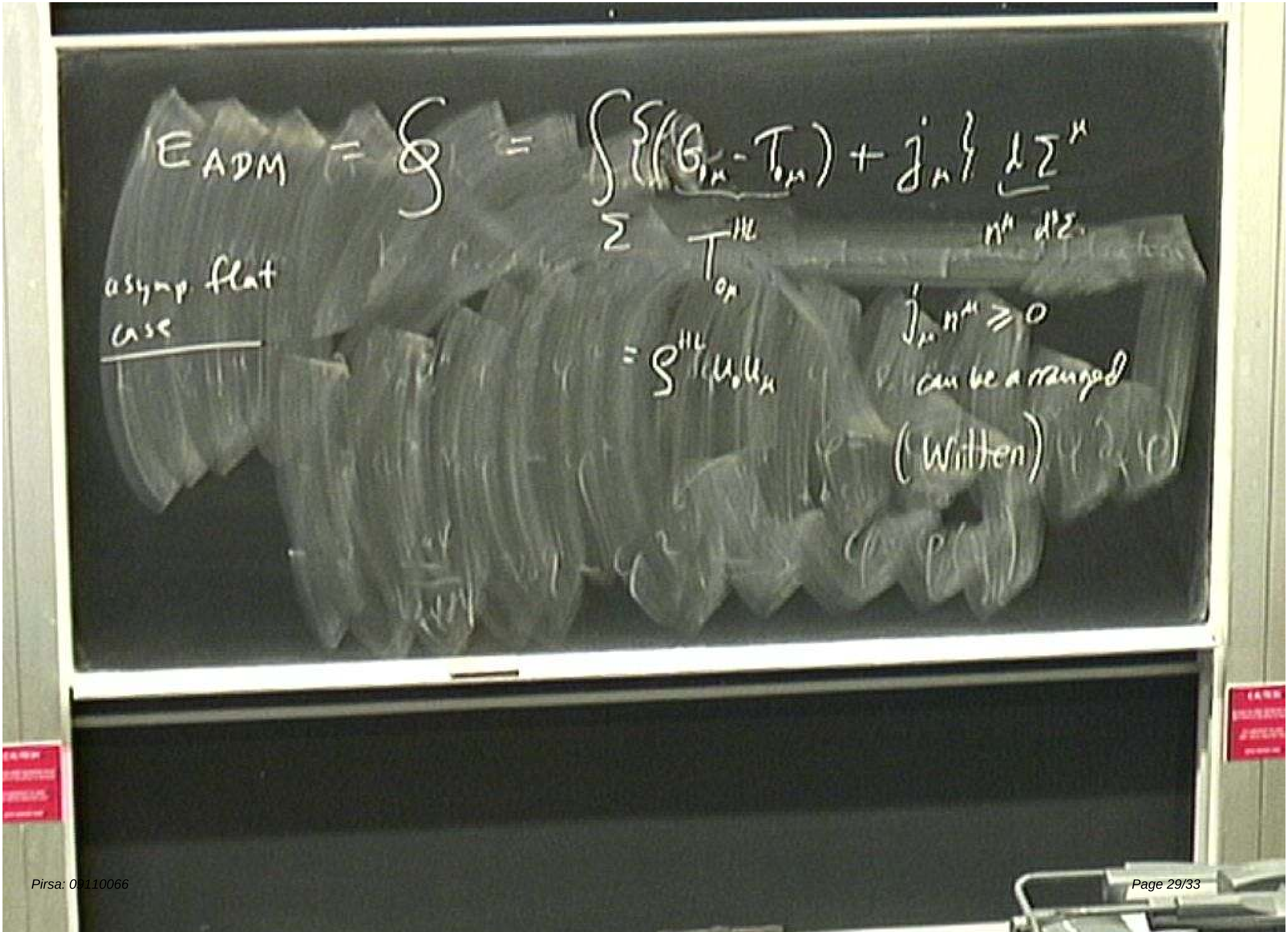
$d\Sigma^\mu = n^\mu d^3\Sigma$

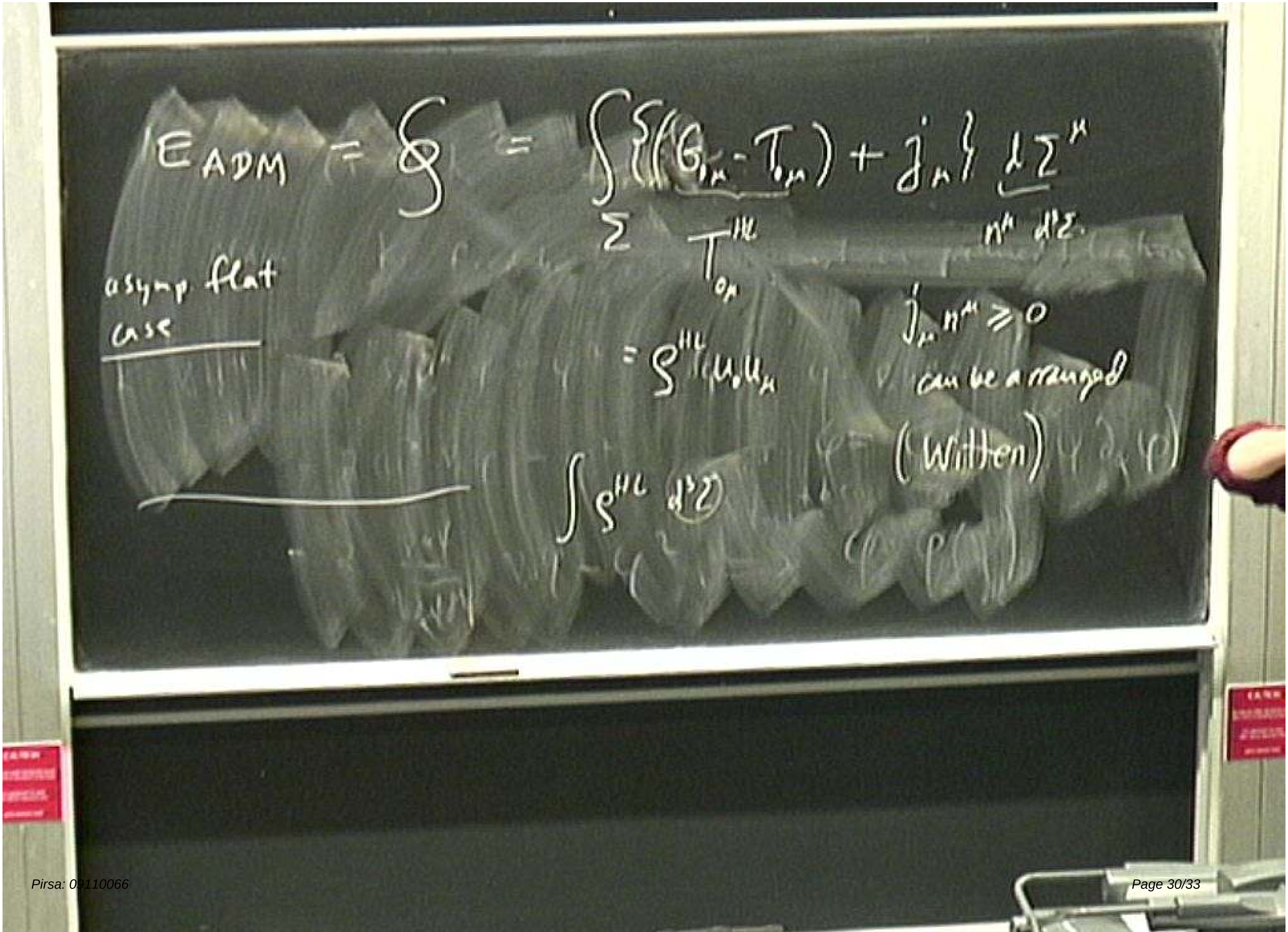
asymp. flat case

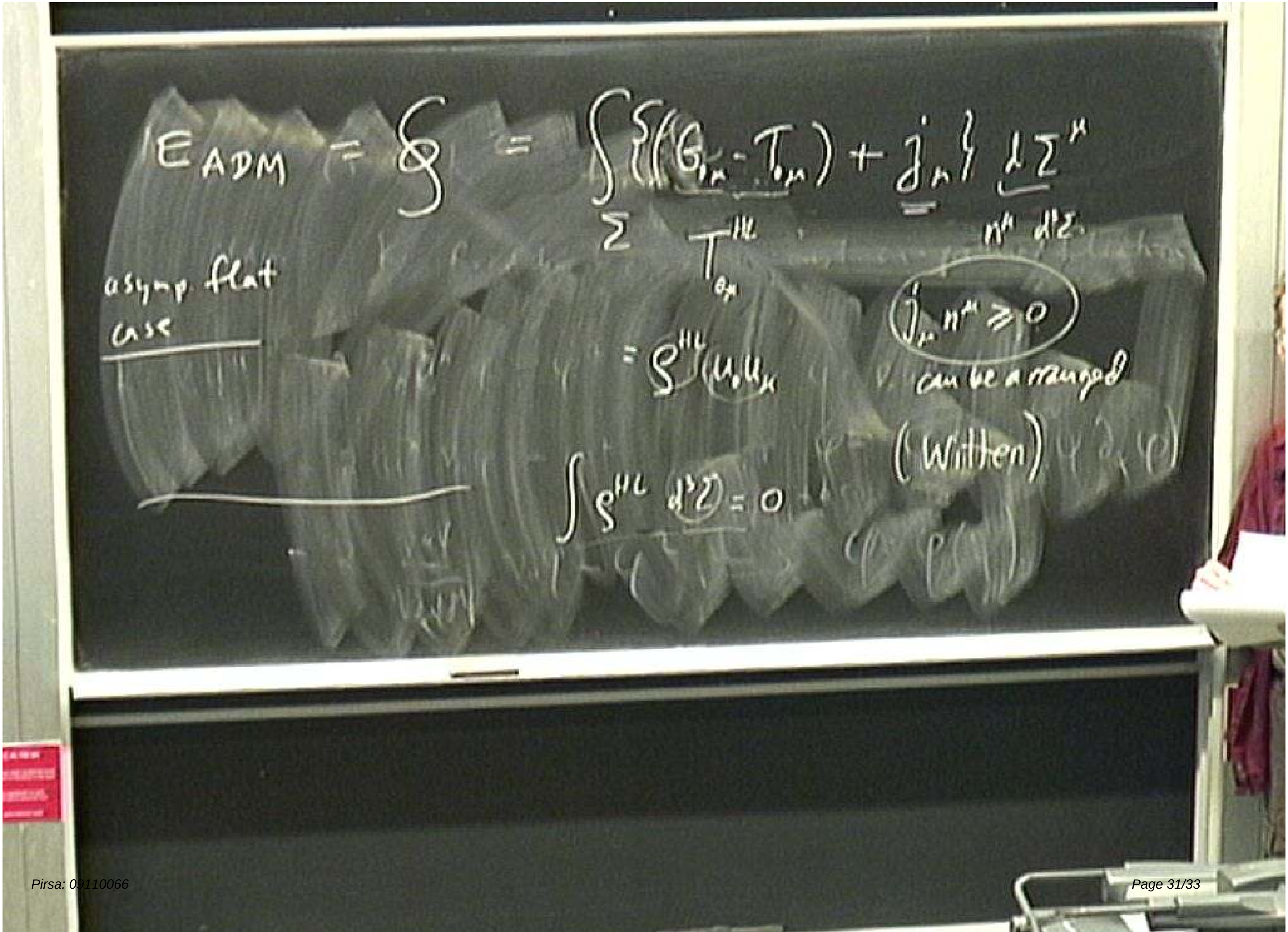
$j_\mu n^\mu \geq 0$

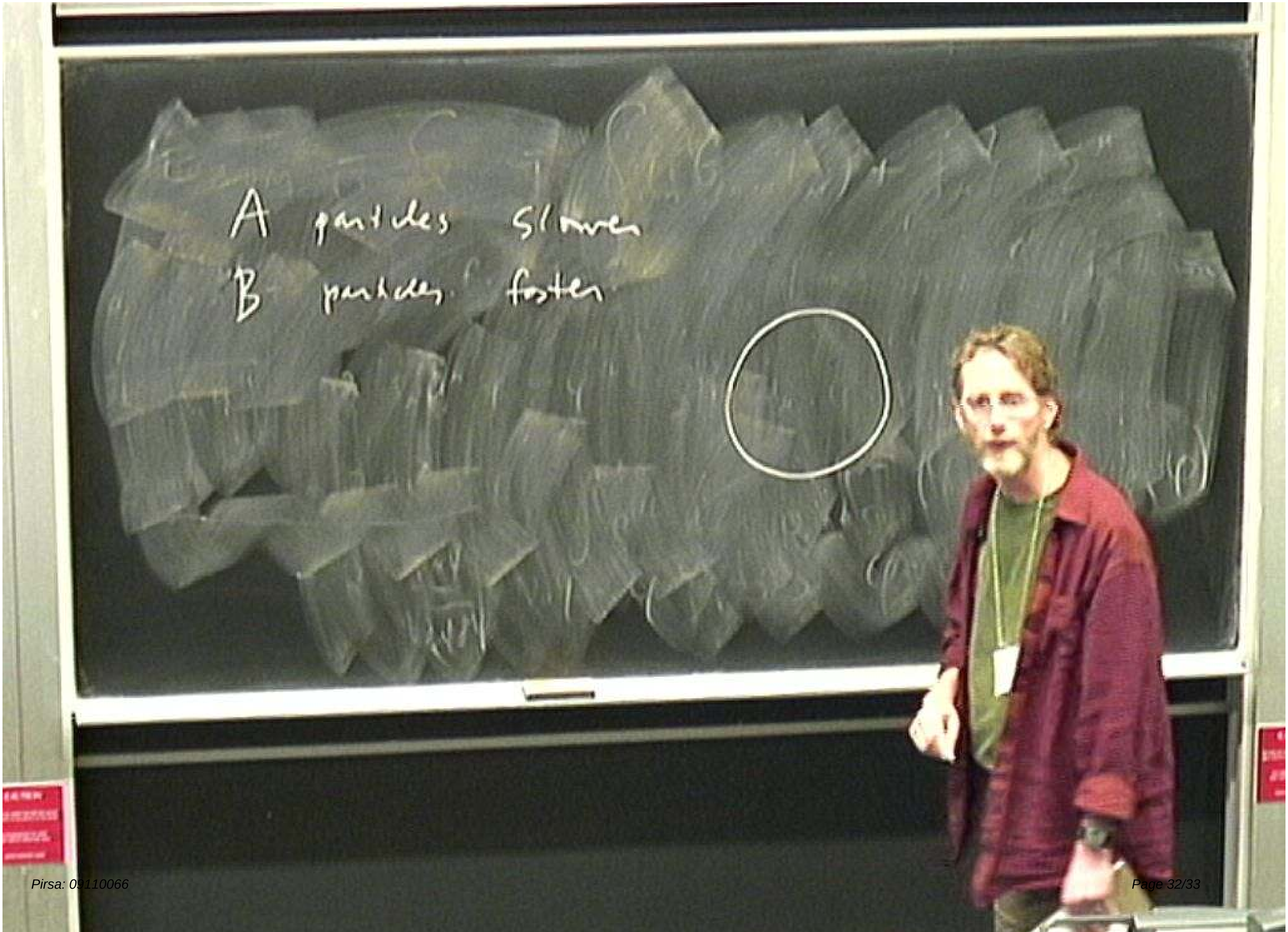
can be arranged

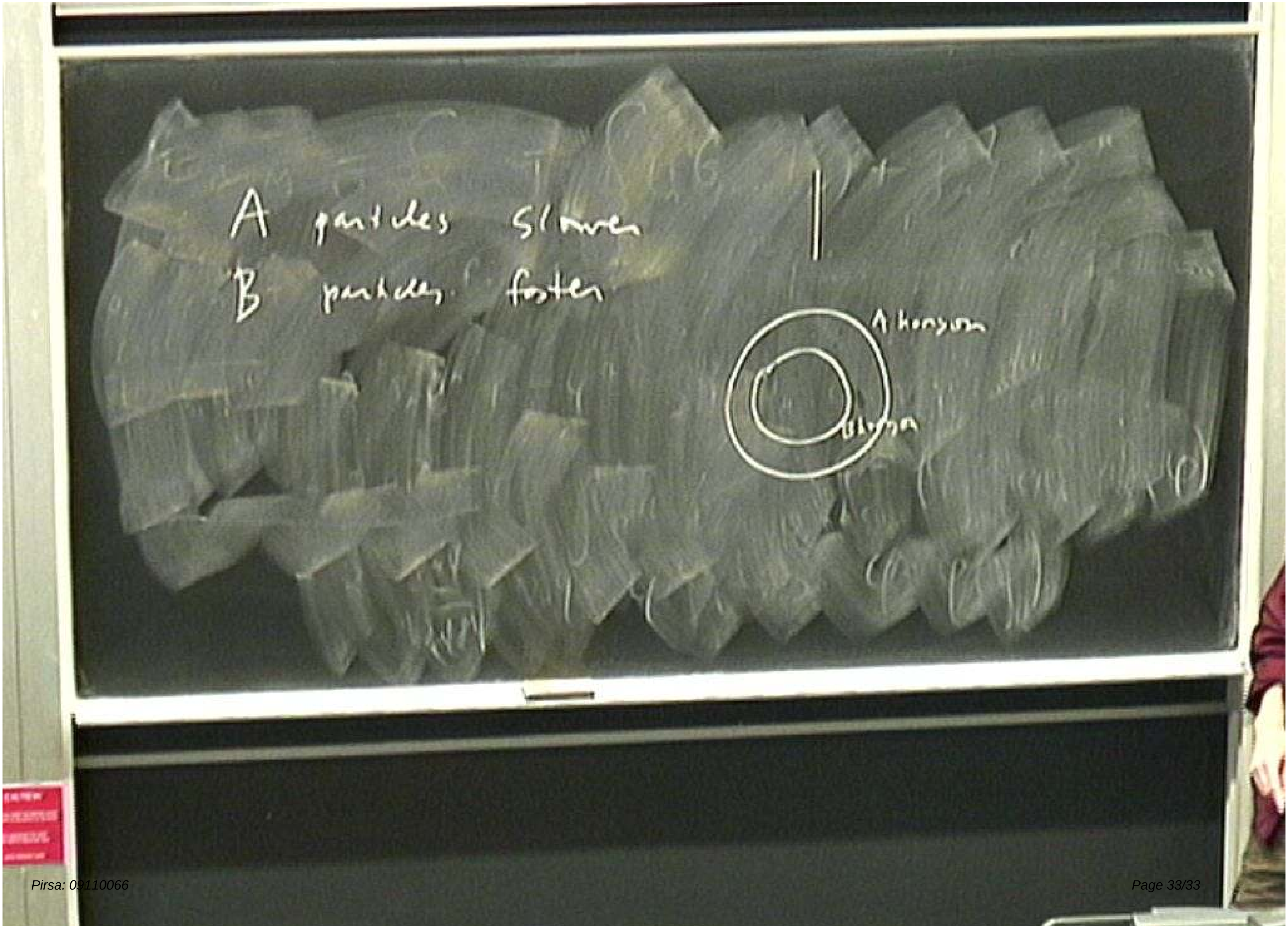
(Witten)


$E_{ADM} = \oint = \int_\Sigma \{(G_{0\mu} - T_{0\mu}) + j_\mu\} d\Sigma^\mu$
$T^{\mu\nu}$
$n^\mu d^2\Sigma$
asymp. flat case
$T_{0\mu}$
$= \rho^{\mu\nu} u_0 u_\mu$
$j_\mu n^\mu \geq 0$
can be arranged
(Witten)


E_ADM = ∮ = ∫_Σ {(G_0μ − T_0μ) + j_μ} dΣ^μ
T^μν
T_0μ
n^μ d^3Σ
asymp flat case
j_μ n^μ ≥ 0
= ρ^μν u_0 u_μ
can be arranged
(Witten)
∫ ρ^μν d^3Σ


E_ADM = ∮ = ∫_Σ {(Θ_0μ − T_0μ) + j_μ} dΣ^μ
asymp. flat case
j_μ n^μ ≥ 0
can be arranged
(Witten)
∫ ρ^μν d³Σ = 0


A particles slower
B particles faster


A particles slower
B particles faster
A horizon