Title: Subluminal Vainshtein Screening in Massive Gravity

Date: Apr 09, 2015 03:15 PM

URL: http://pirsa.org/15040102

Abstract: I will discuss the Vainshtein mechanism in massive gravity. I will show that the spherically symmetric backgrounds that were believed to have superluminal sound speed are in fact unstable. Instead, there is a new class of phenomenologically relevant solutions with stable and subluminal perturbations.

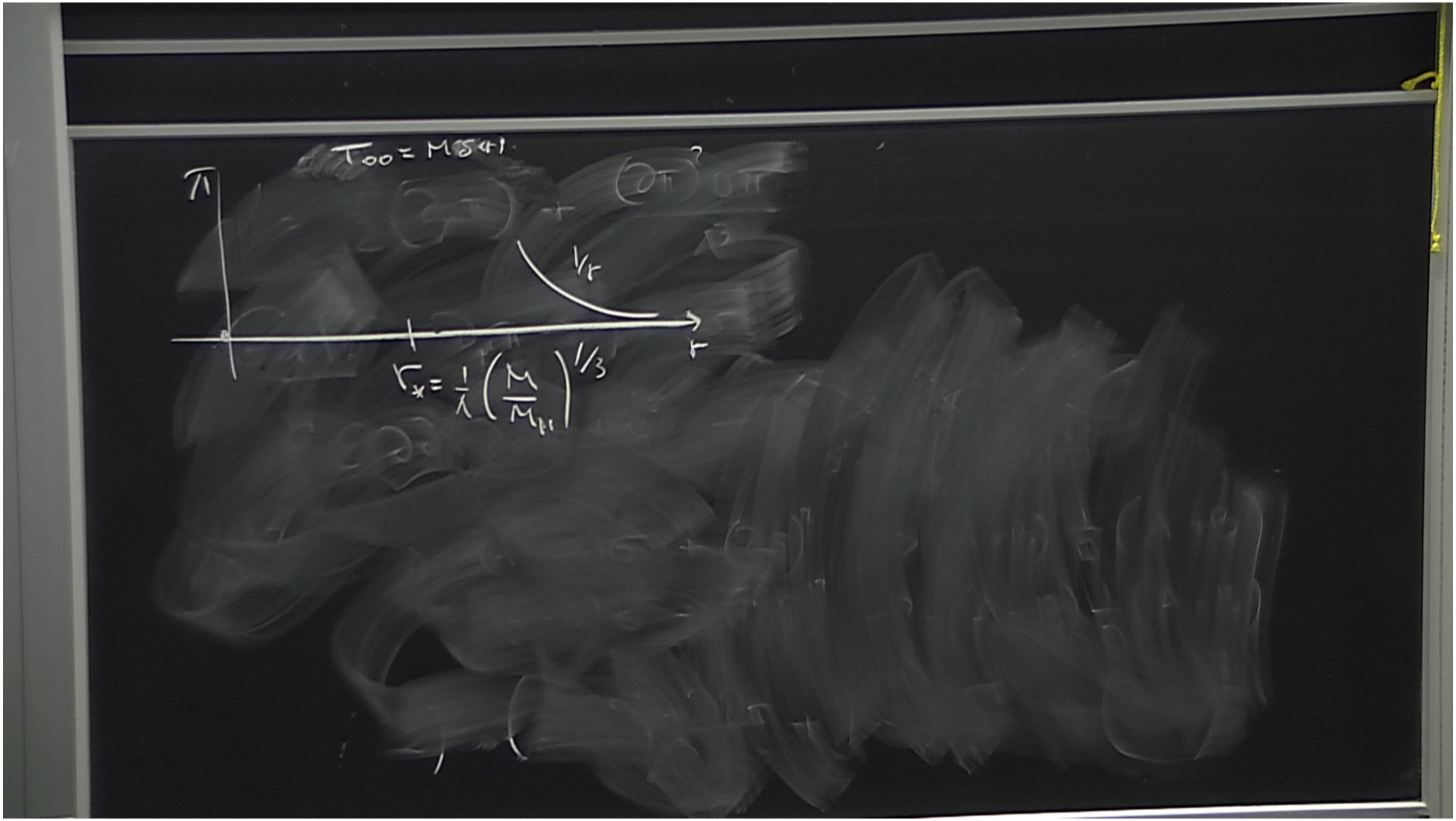
$m \to 0 \qquad M_{pl} \to \infty \qquad \Lambda = (m^2 M_{pl})^{1/3}$

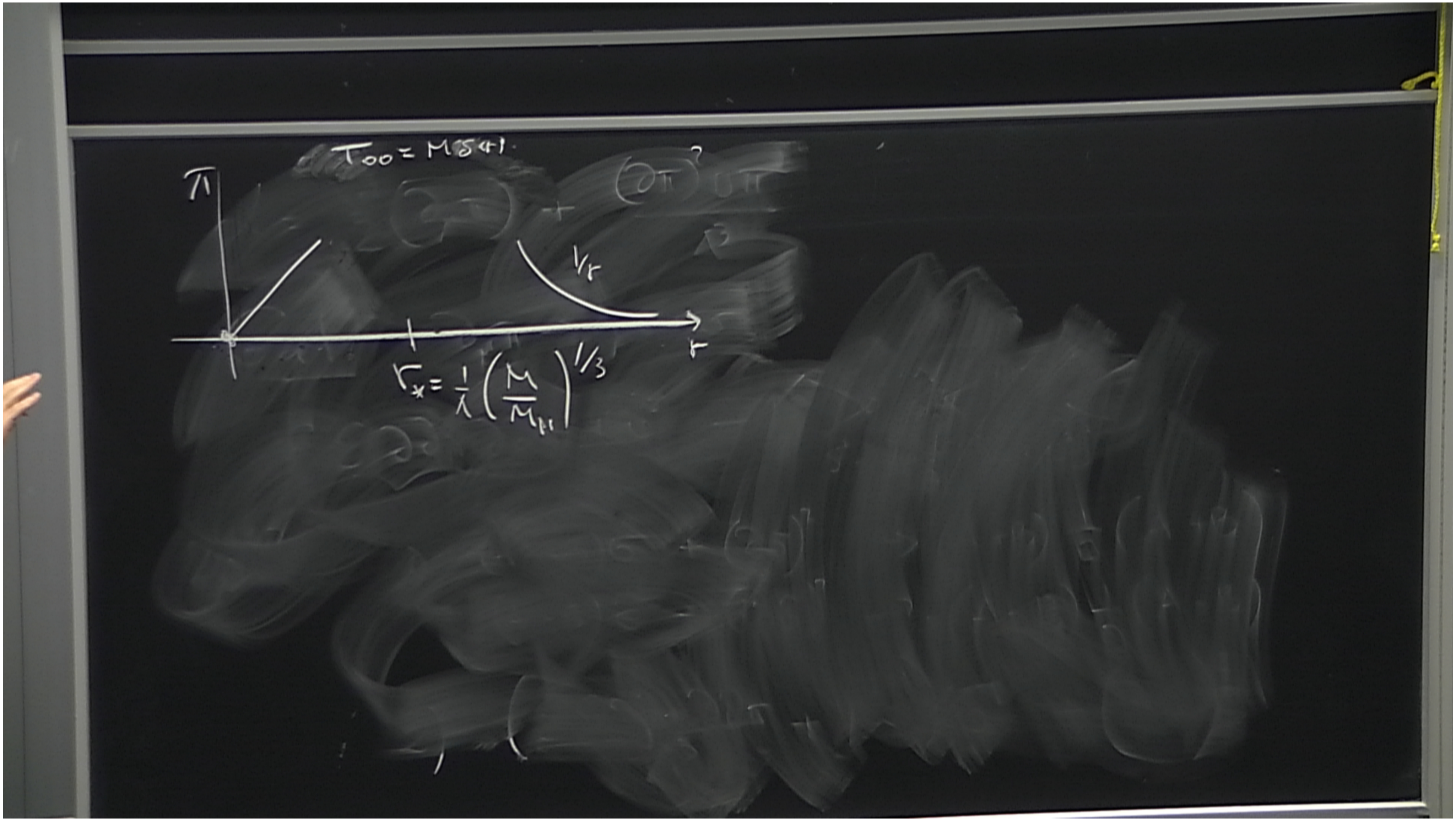
$$\mathcal{L} = h\mathcal{E}h + h\left(\partial\partial\pi + \alpha\frac{(\partial\partial\pi)^2}{\Lambda^3} + \beta\frac{(\partial\partial\pi)^3}{\Lambda^6}\right) + \frac{hT}{M_{pl}}$$

$\beta = 0.$

$$h \to h + \eta\pi + \partial_\mu\pi\,\partial_\nu\pi$$

$$\mathcal{L}_\pi = +\pi\Box\pi + \alpha\frac{(\partial\pi)^2\Box\pi}{\Lambda^3} + \alpha^2\frac{(\partial\pi)^2(\partial\partial\pi)^2}{\Lambda^6} + \frac{\pi T}{M_{pl}} + \alpha\frac{\partial_\mu\pi\,\partial_\nu\pi\,T_{\mu\nu}}{\Lambda^3 M_{pl}}$$


T00 = Mδ3(r)
π
1/r
r
r* = 1/λ (M/MPl)^1/3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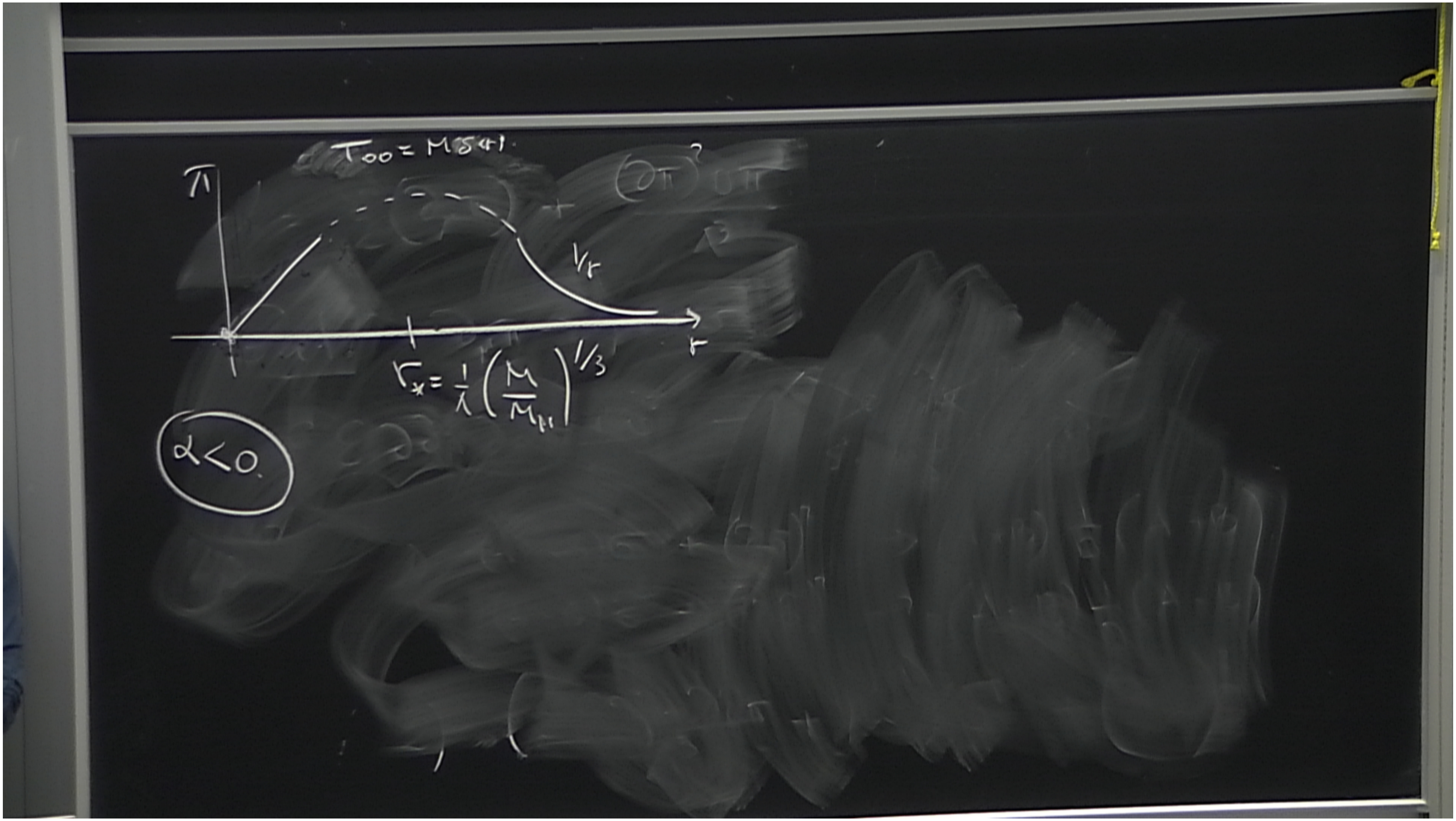
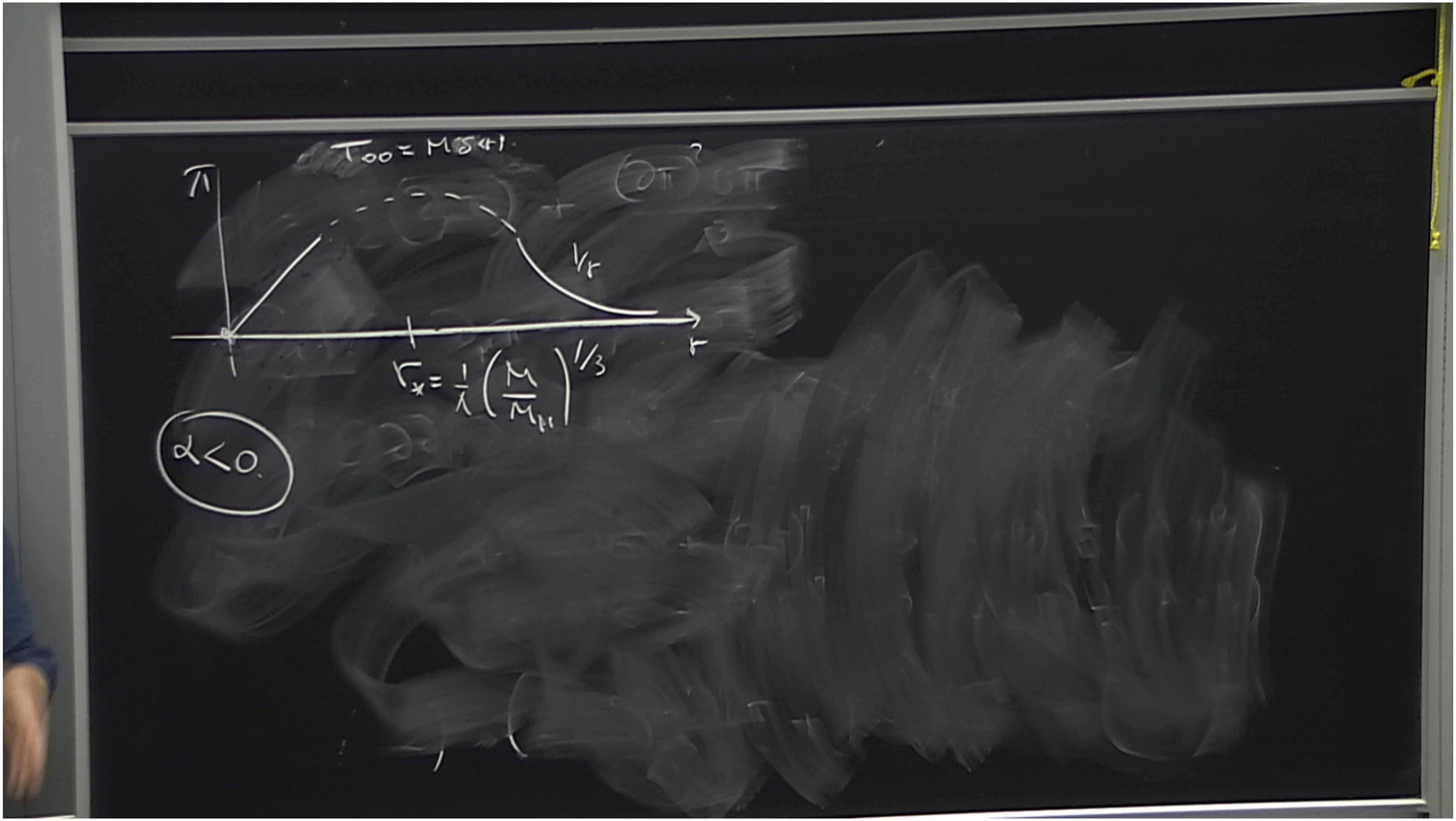

$T_{00} = M\delta(r)$
π
$1/r$
r
$r_* = \frac{1}{\Lambda}\left(\frac{M}{M_{Pl}}\right)^{1/3}$
$\alpha < 0$



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1/r
r
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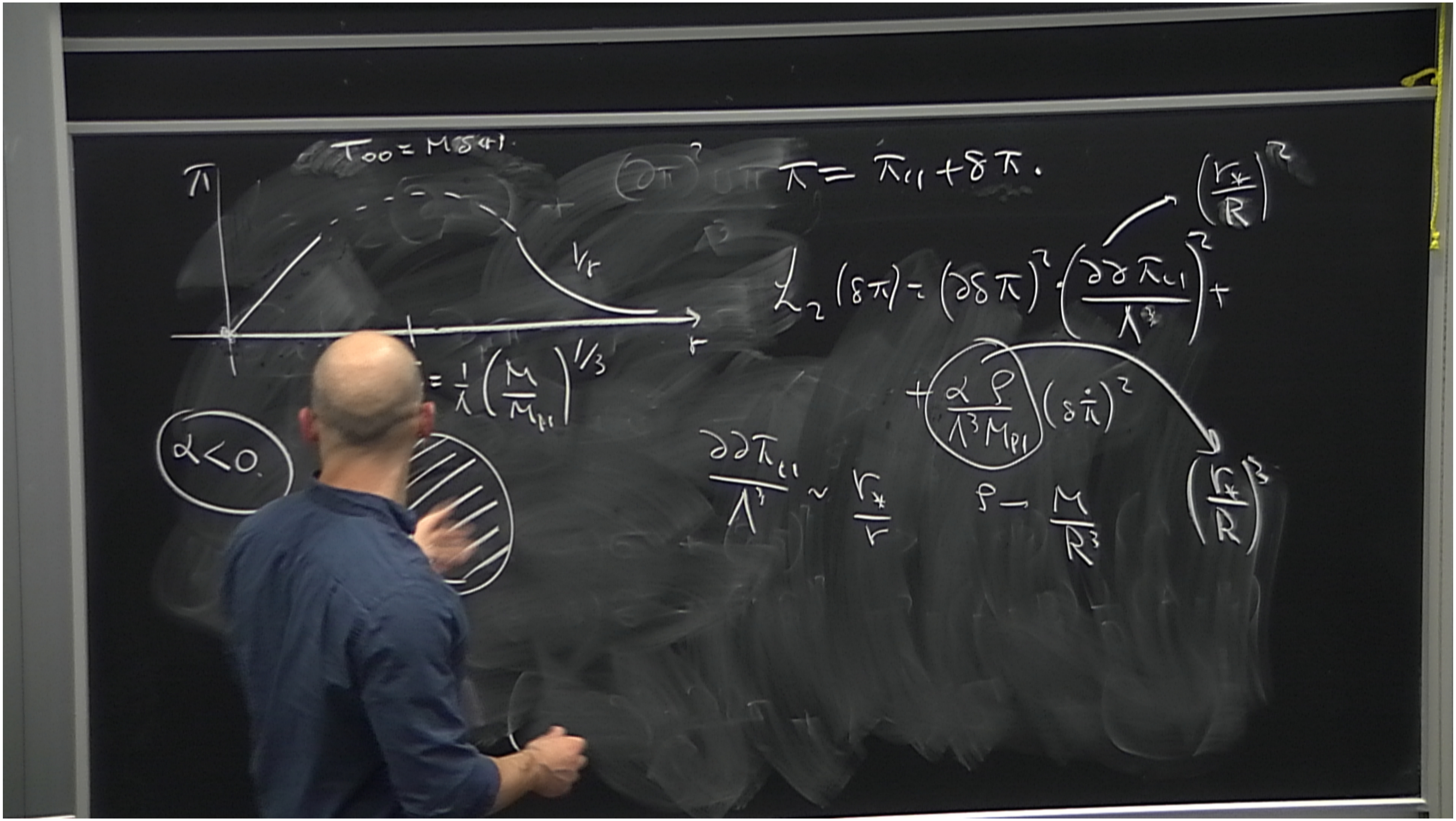
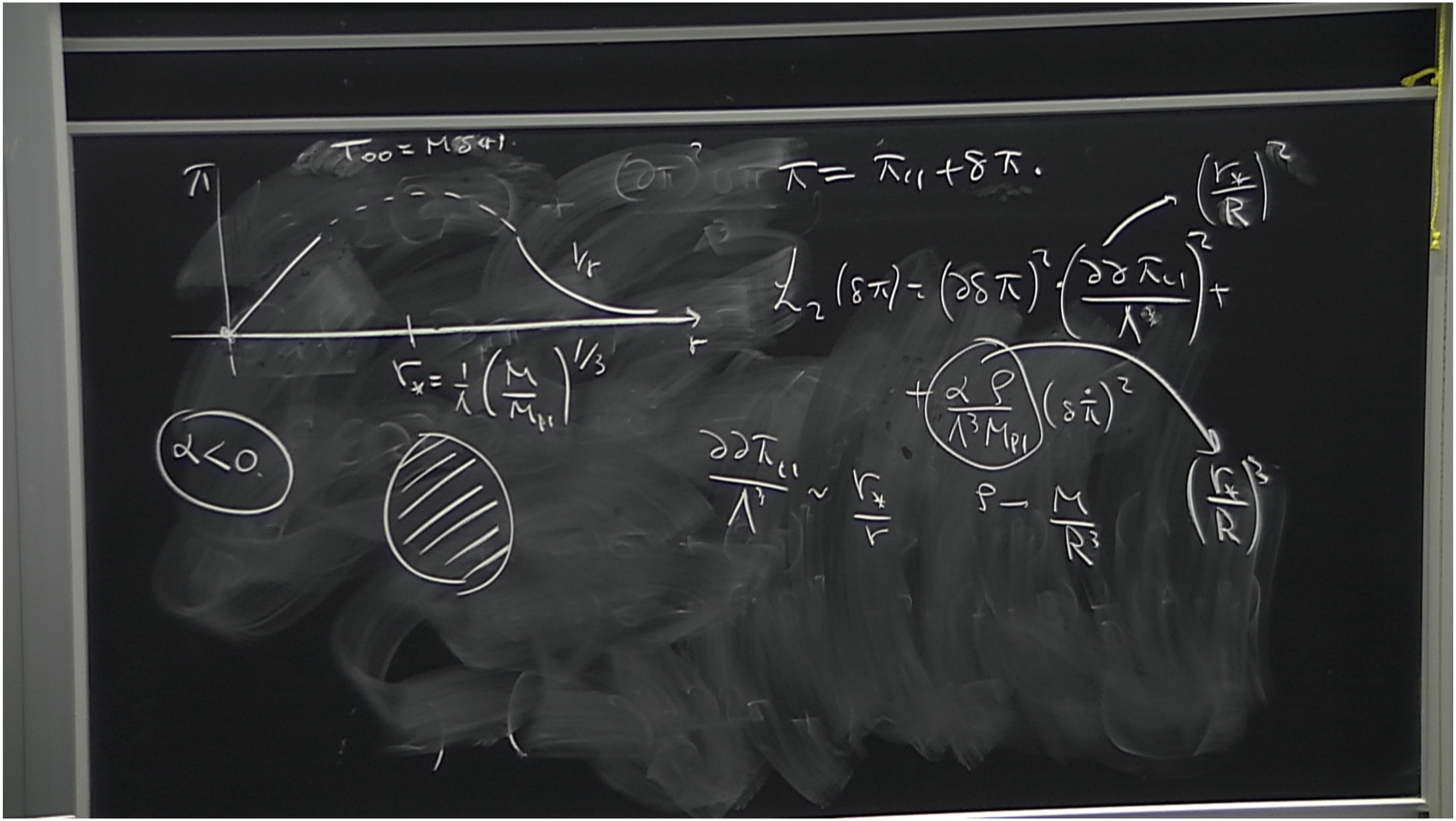
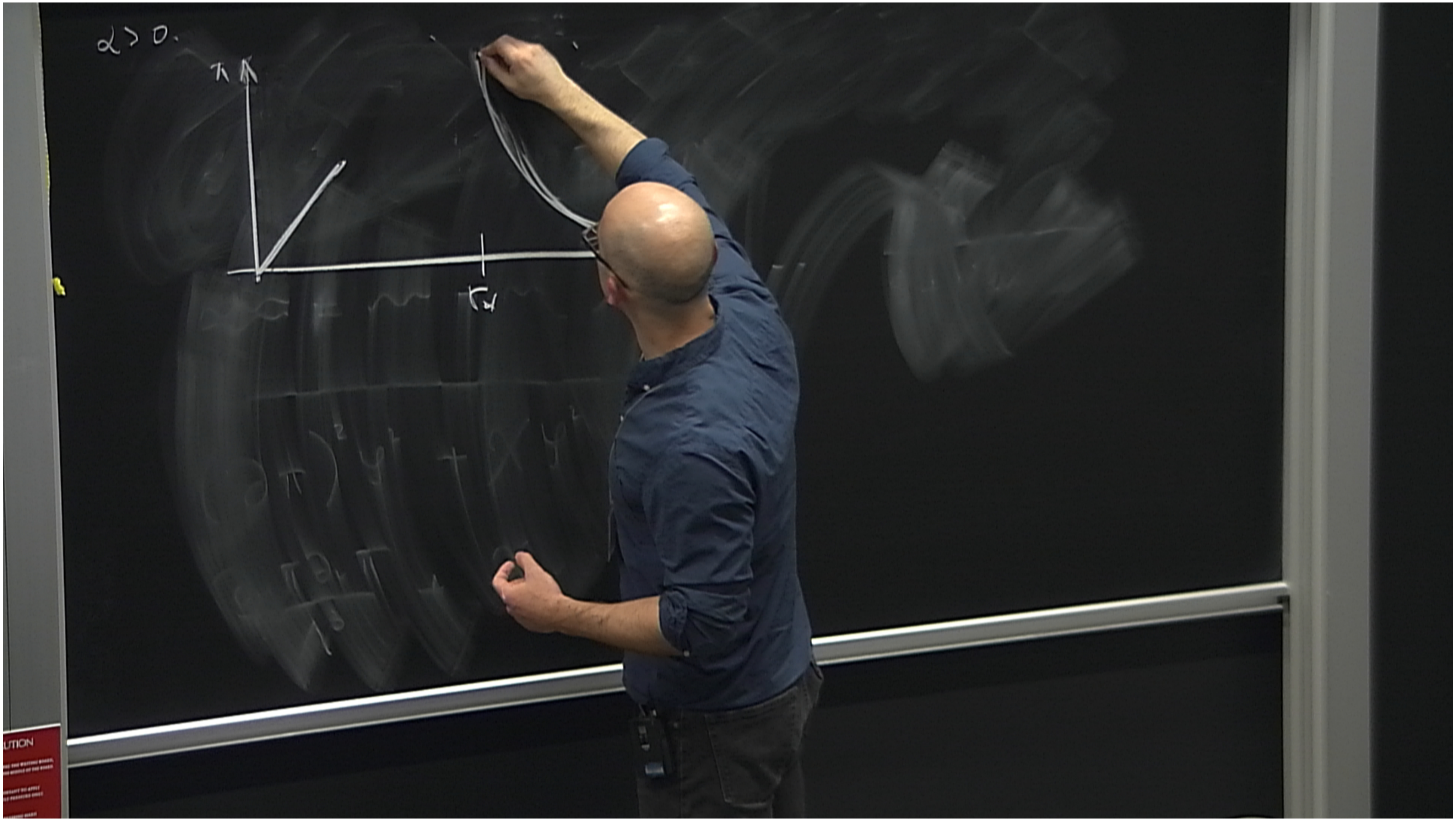
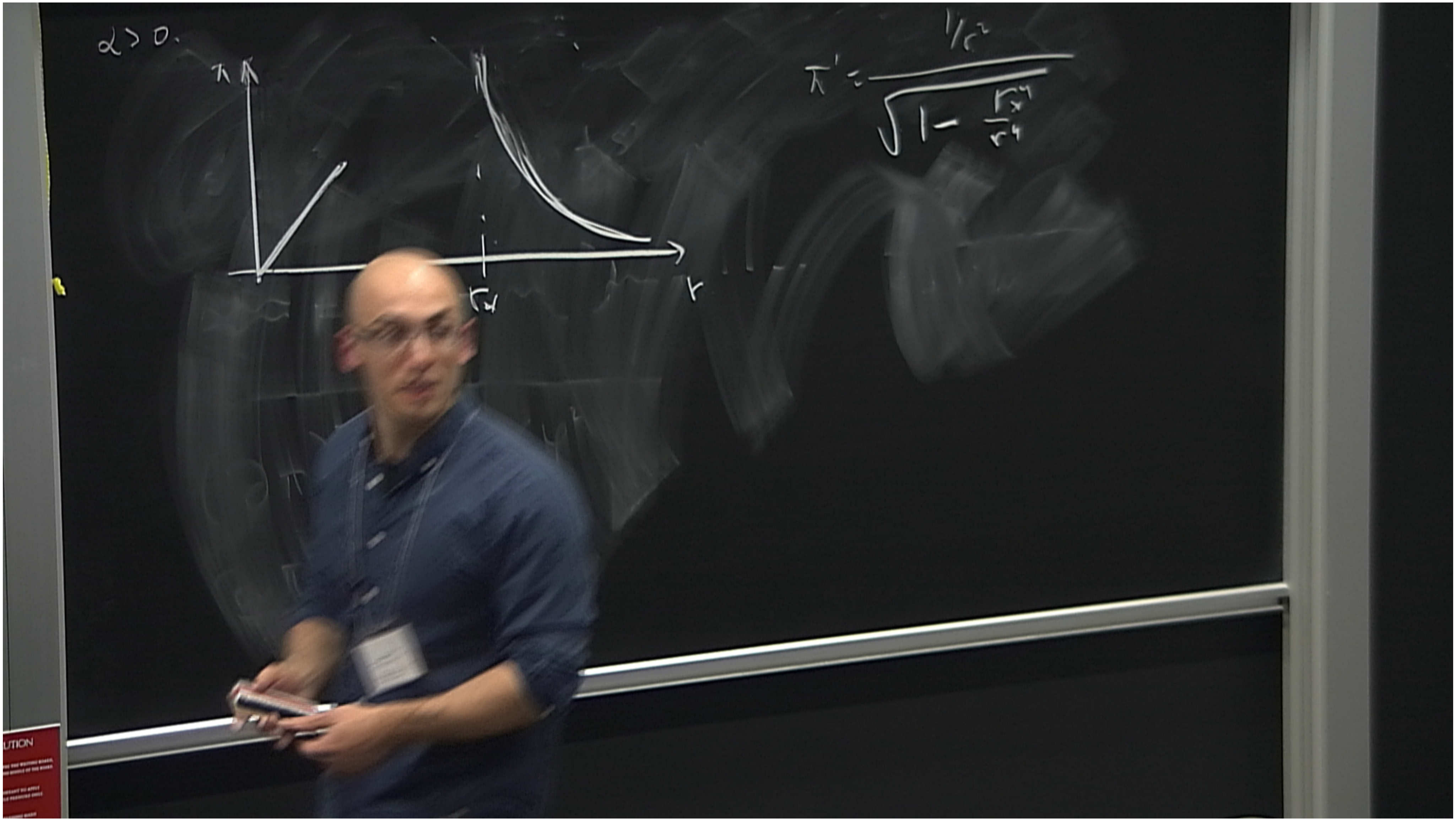
α<0

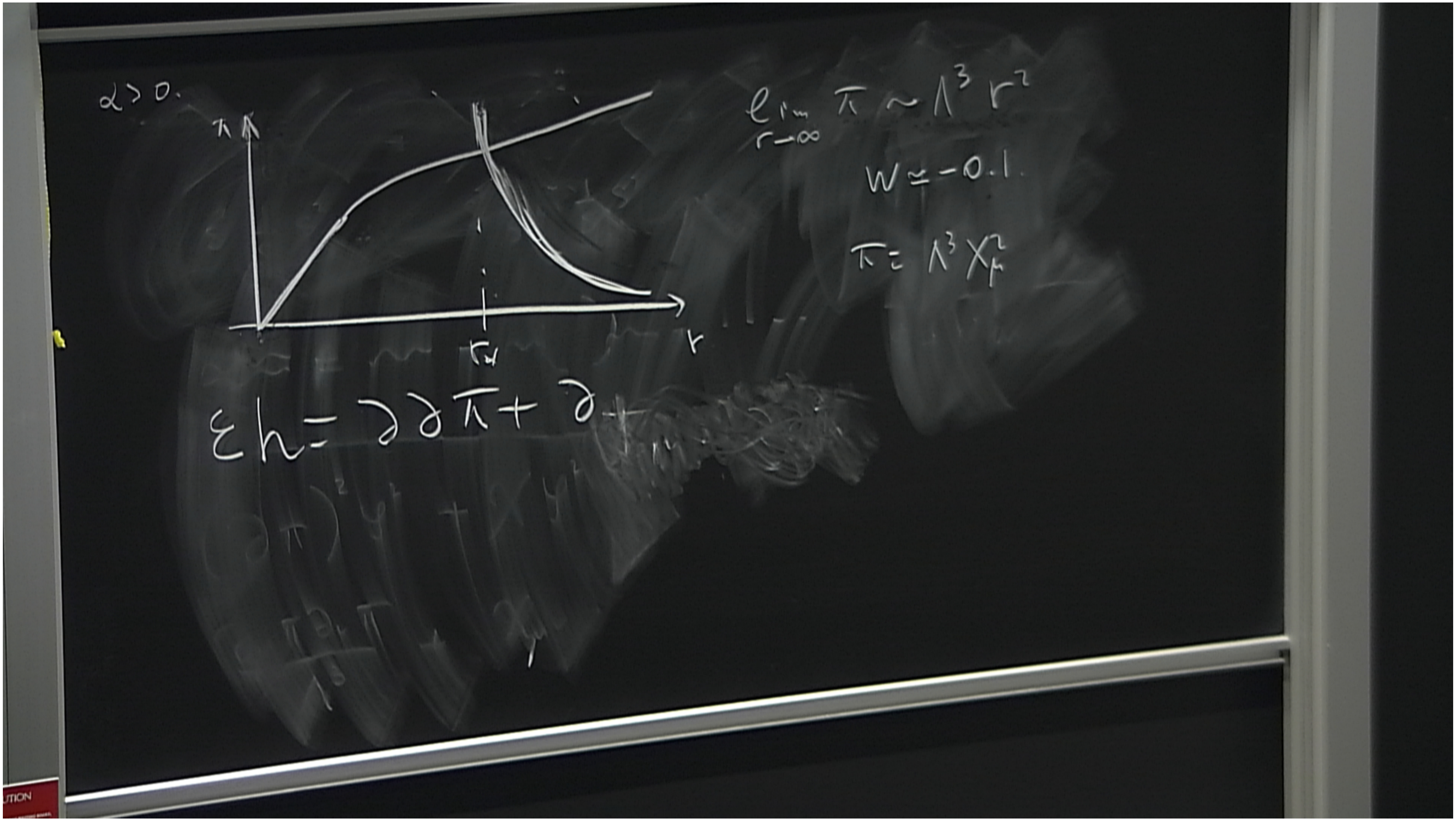

T00 = M δ(r)
π = π_cl + δπ
L_2 (δπ) = (∂δπ)^2 + (∂∂π_cl / Λ^3)^2 +
+ (α ρ / Λ^3 M_Pl) (δπ̇)^2
(r_* / R)^2
(r_* / R)^3
∂∂π_cl / Λ^3 ~ r_* / r
ρ → M / R^3
α < 0.
1/r
= 1/Λ (M / M_Pl)^1/3



T00 = M δ(r)
π
1/r
r
r* = 1/Λ (M/Mpl)^1/3
α<0
π = πcl + δπ
L2 (δπ) = (∂δπ)^2 (∂∂πcl / Λ^3)^2 +
+ (α ρ / Λ^3 Mpl) (δπ̇)^2
(r*/R)^2
(r*/R)^3
∂∂πcl / Λ^3 ~ r*/r
ρ ~ M/R^3


α > 0.


α > 0.
r


α > 0.
π
r_α
r
lim_{r→∞} π ~ Λ^3 r^2
w ≃ −0.1
π = Λ^3 X_μ^2
εh = ∂∂π + ∂

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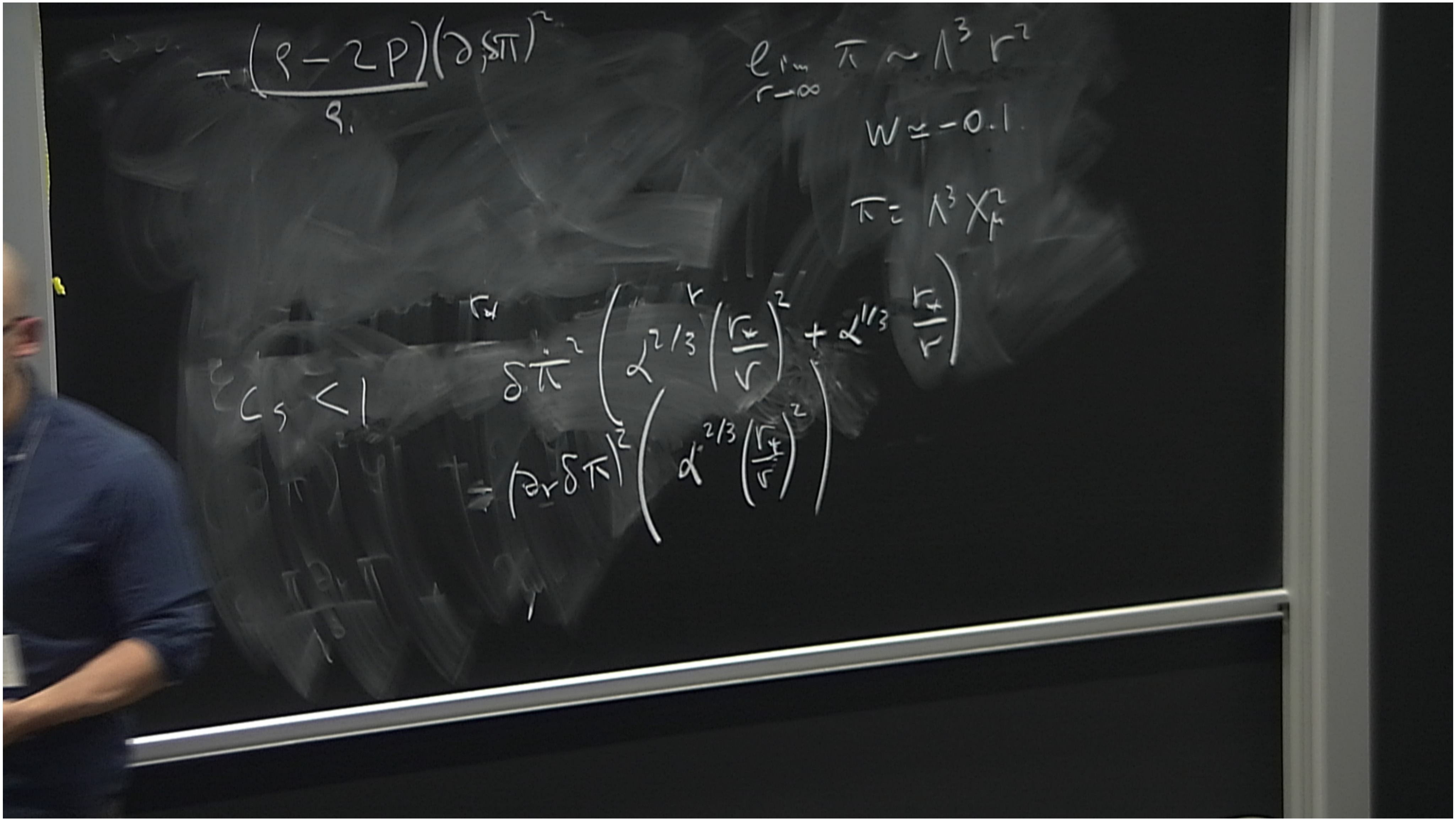
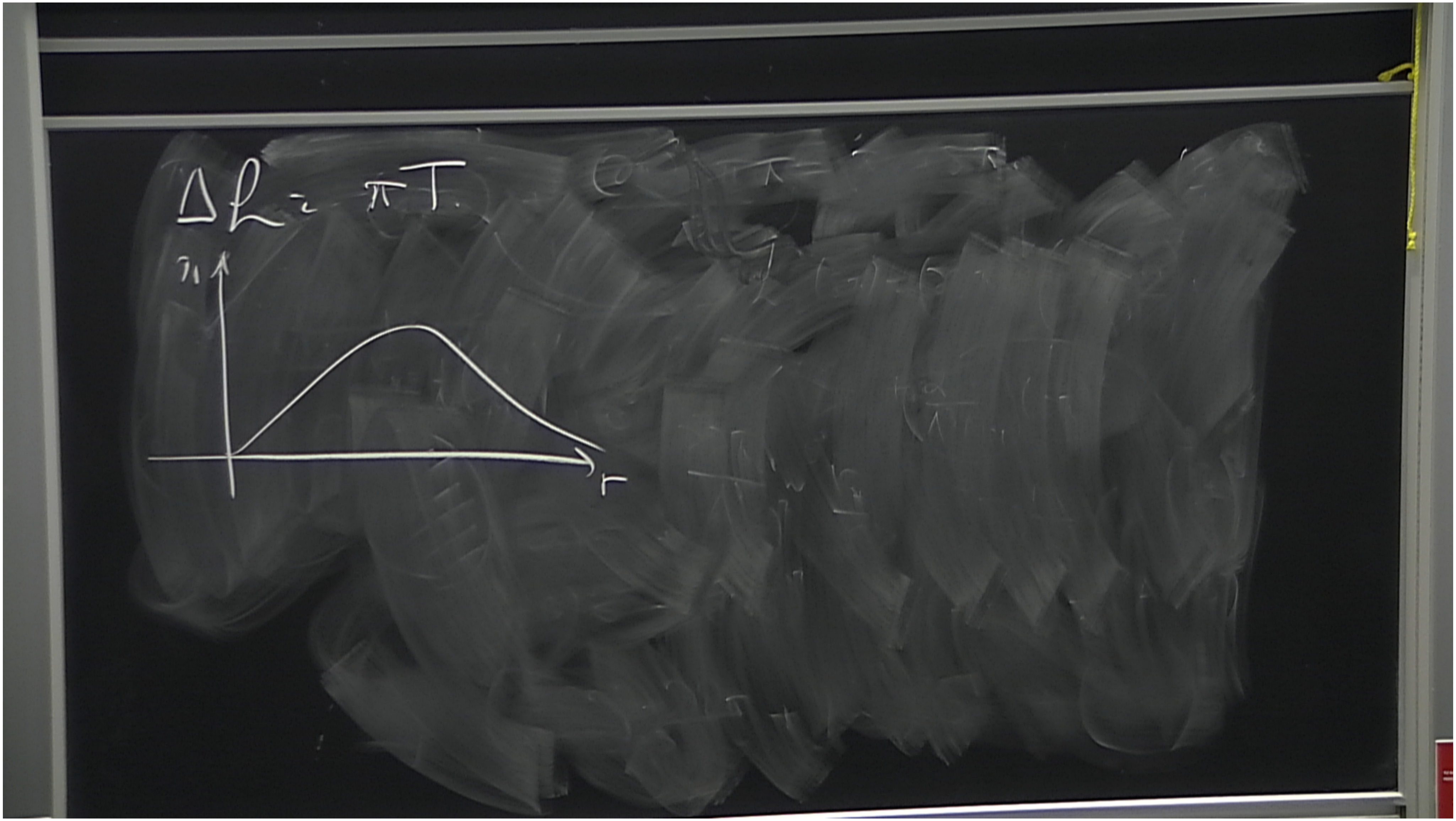
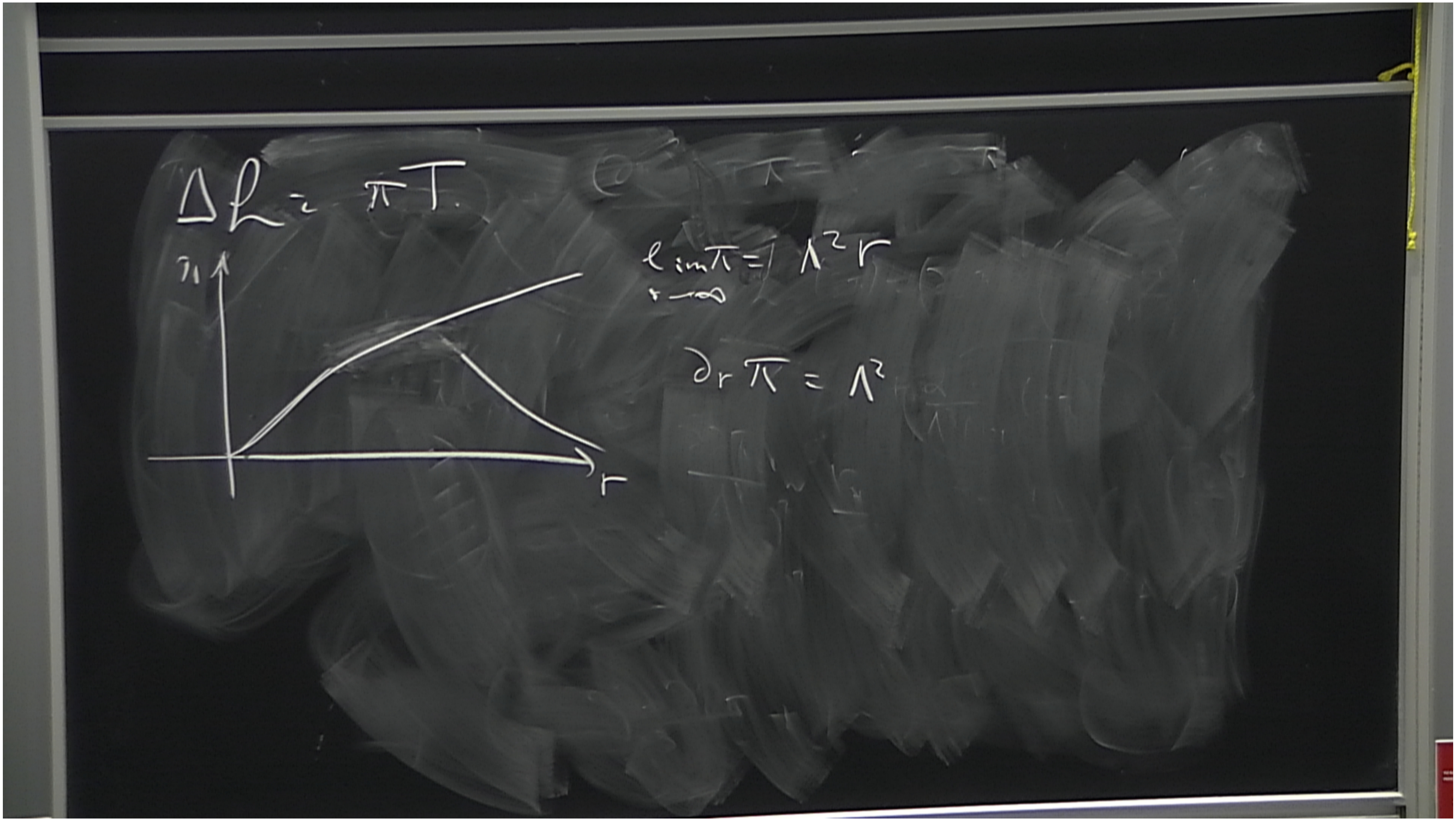

W ≃ -0.1
c_s < 1


Δh = πT.
r


Δh = πT.
lim π = Λ² r
r→∞
∂ᵣ π = Λ²
r

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