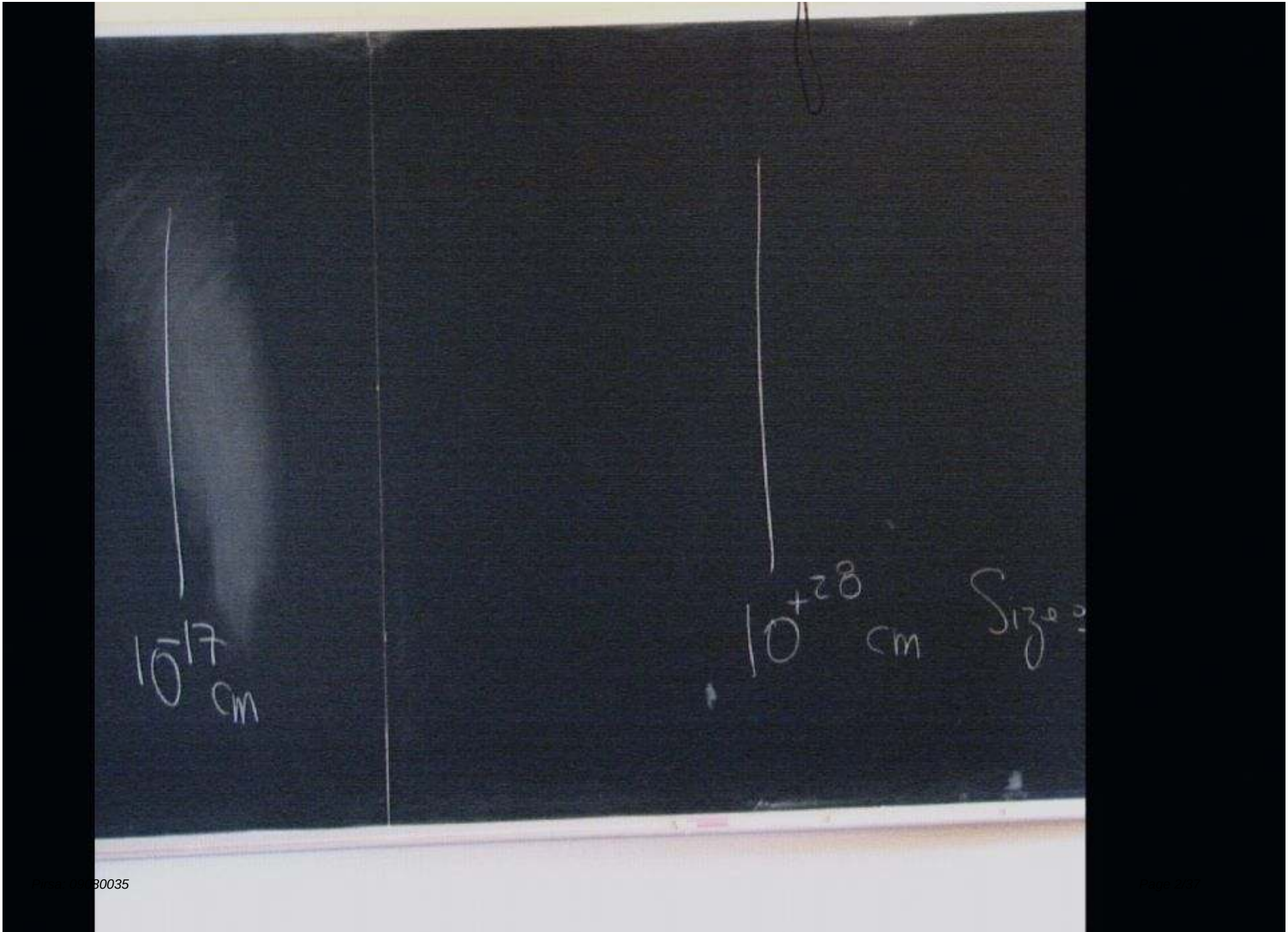
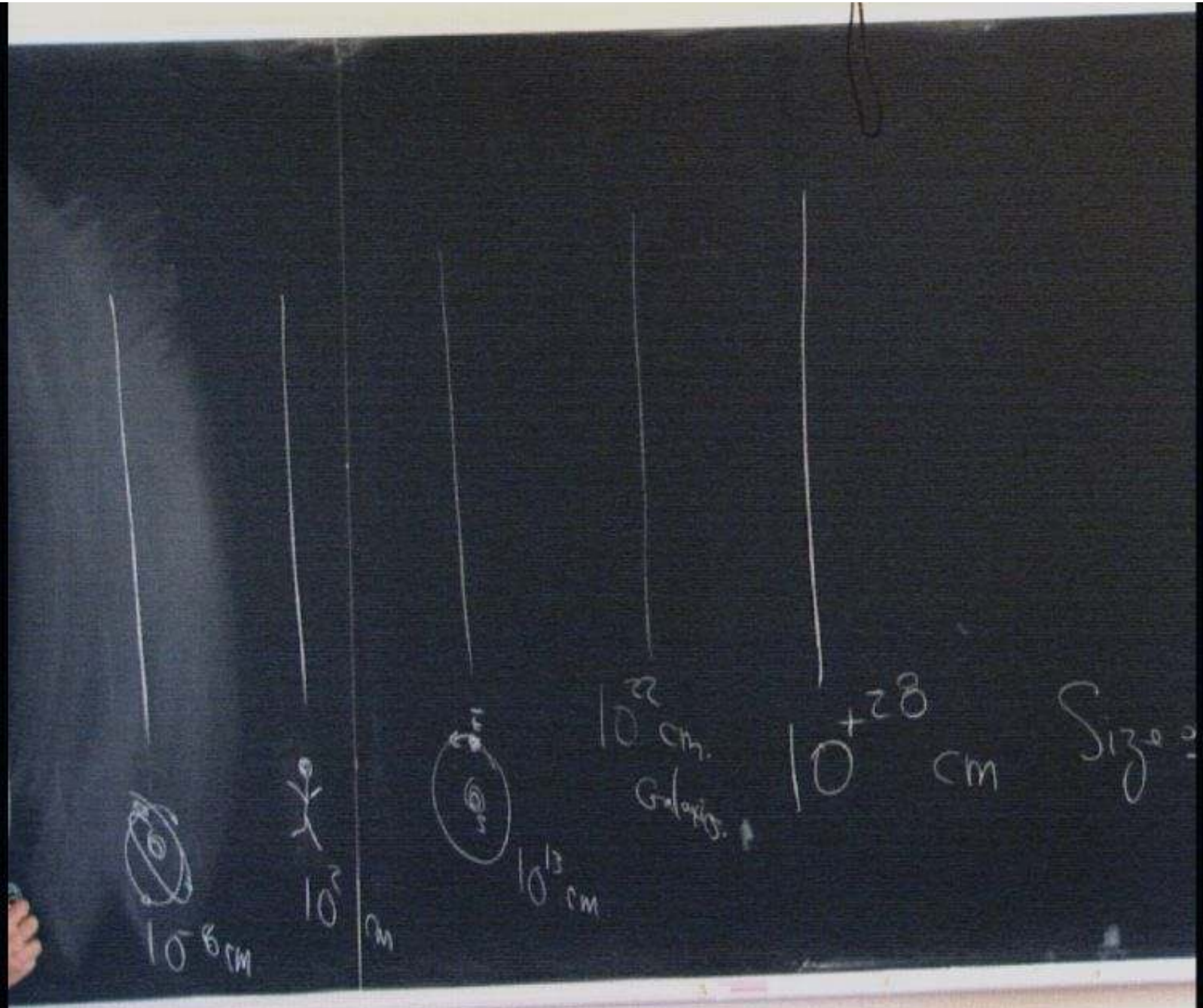
Title: PSI - Research Skills 1A

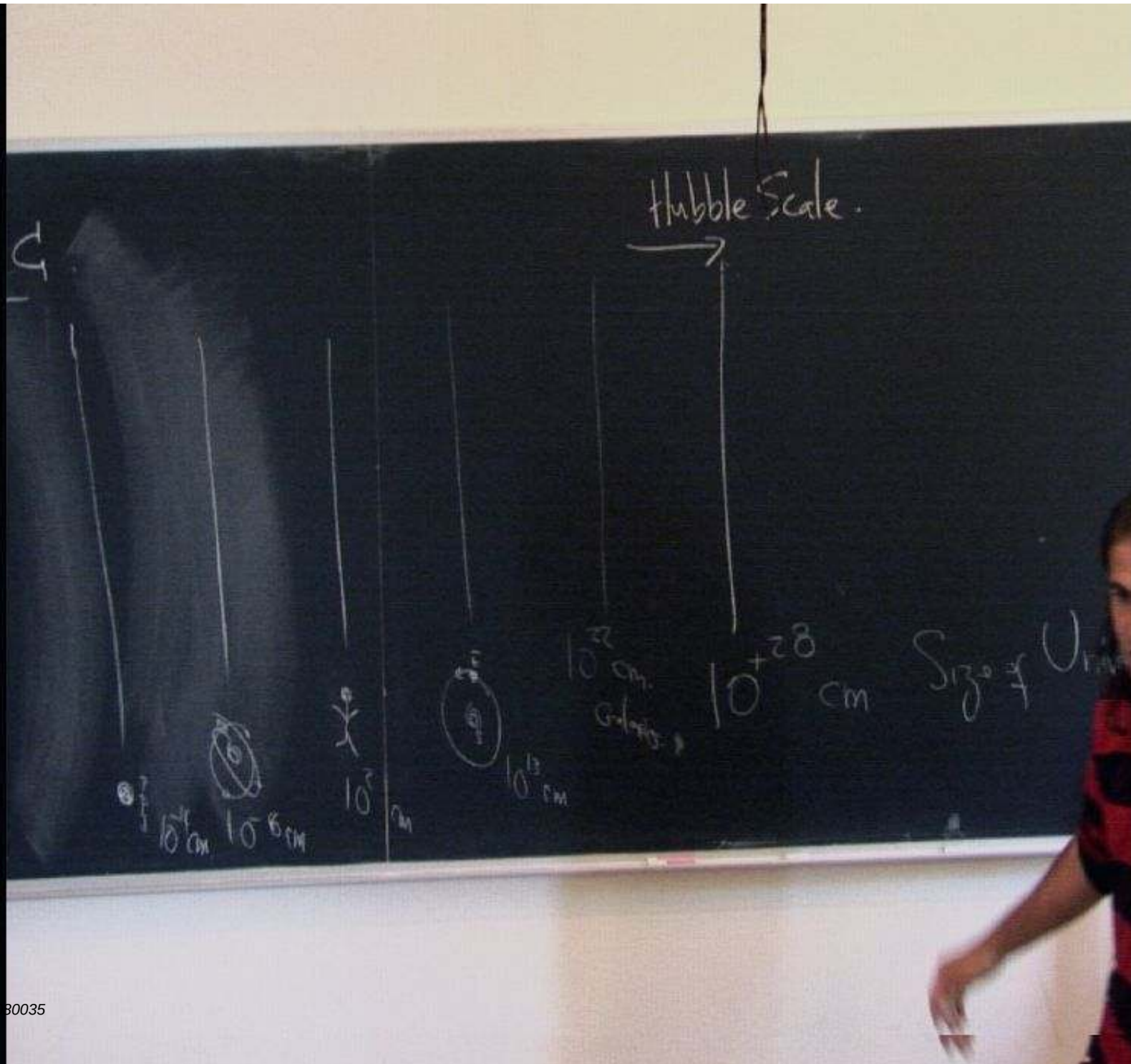
Date: Aug 24, 2009 09:00 AM

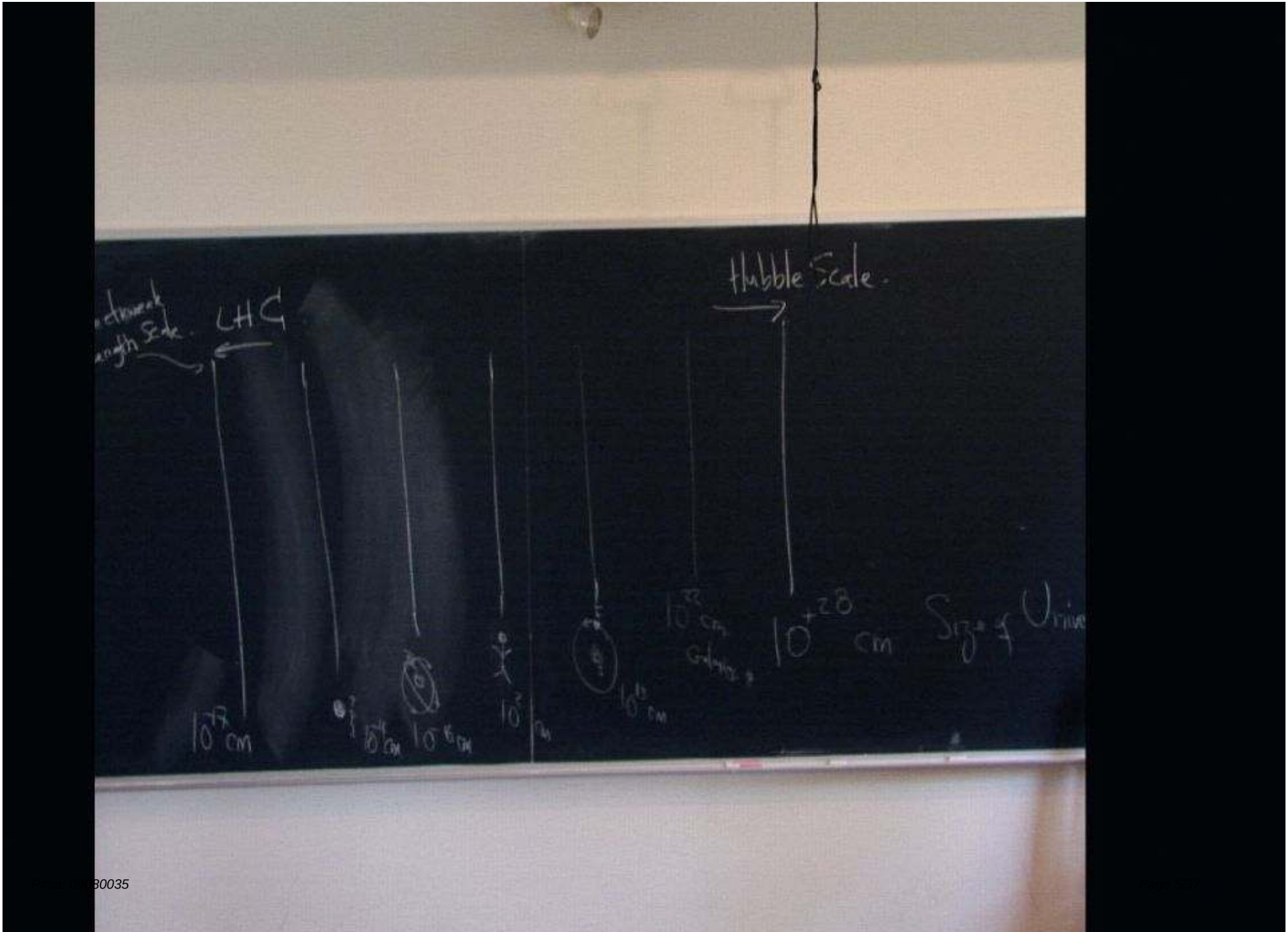
URL: http://pirsa.org/09080035

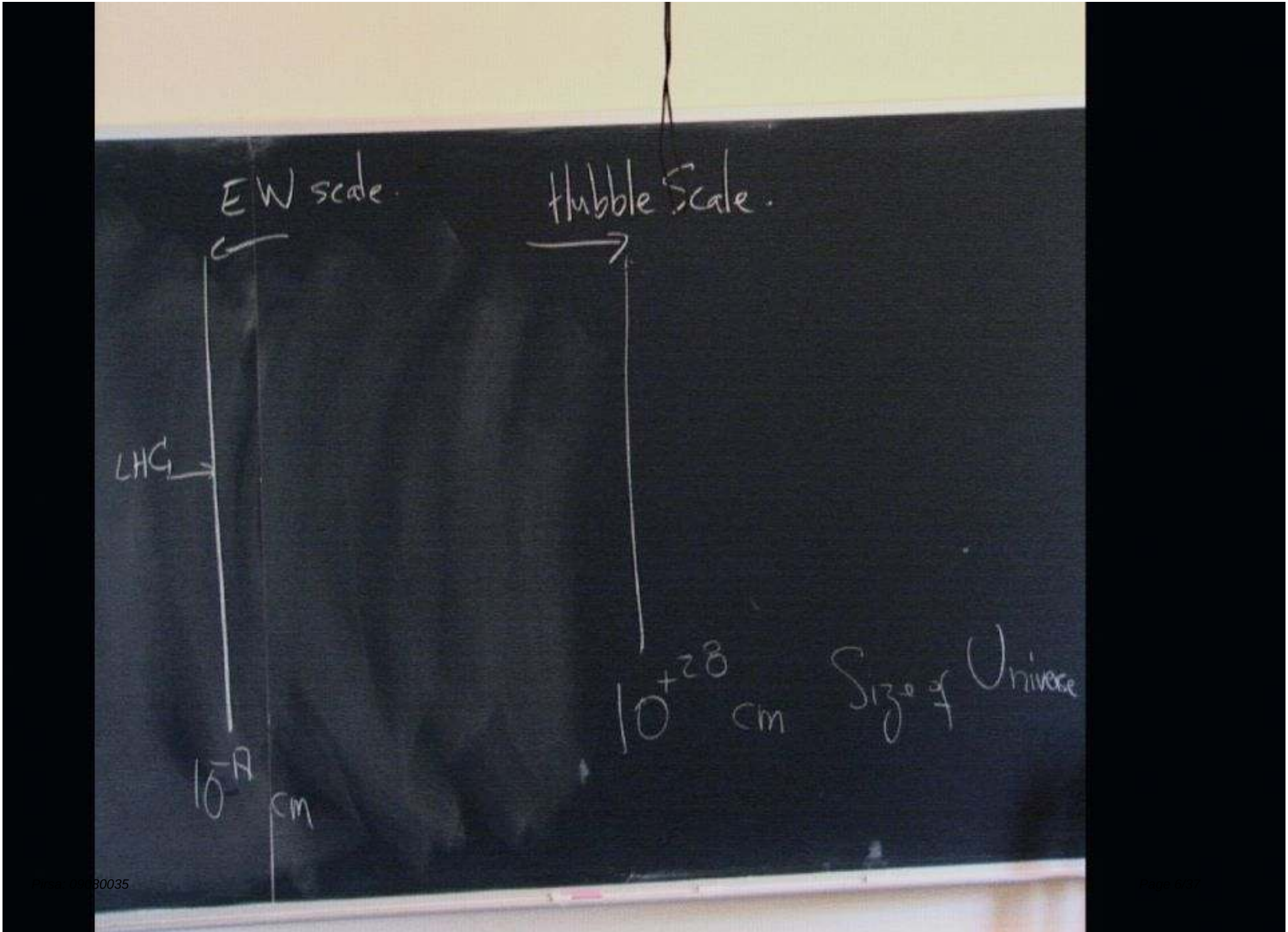
Abstract:

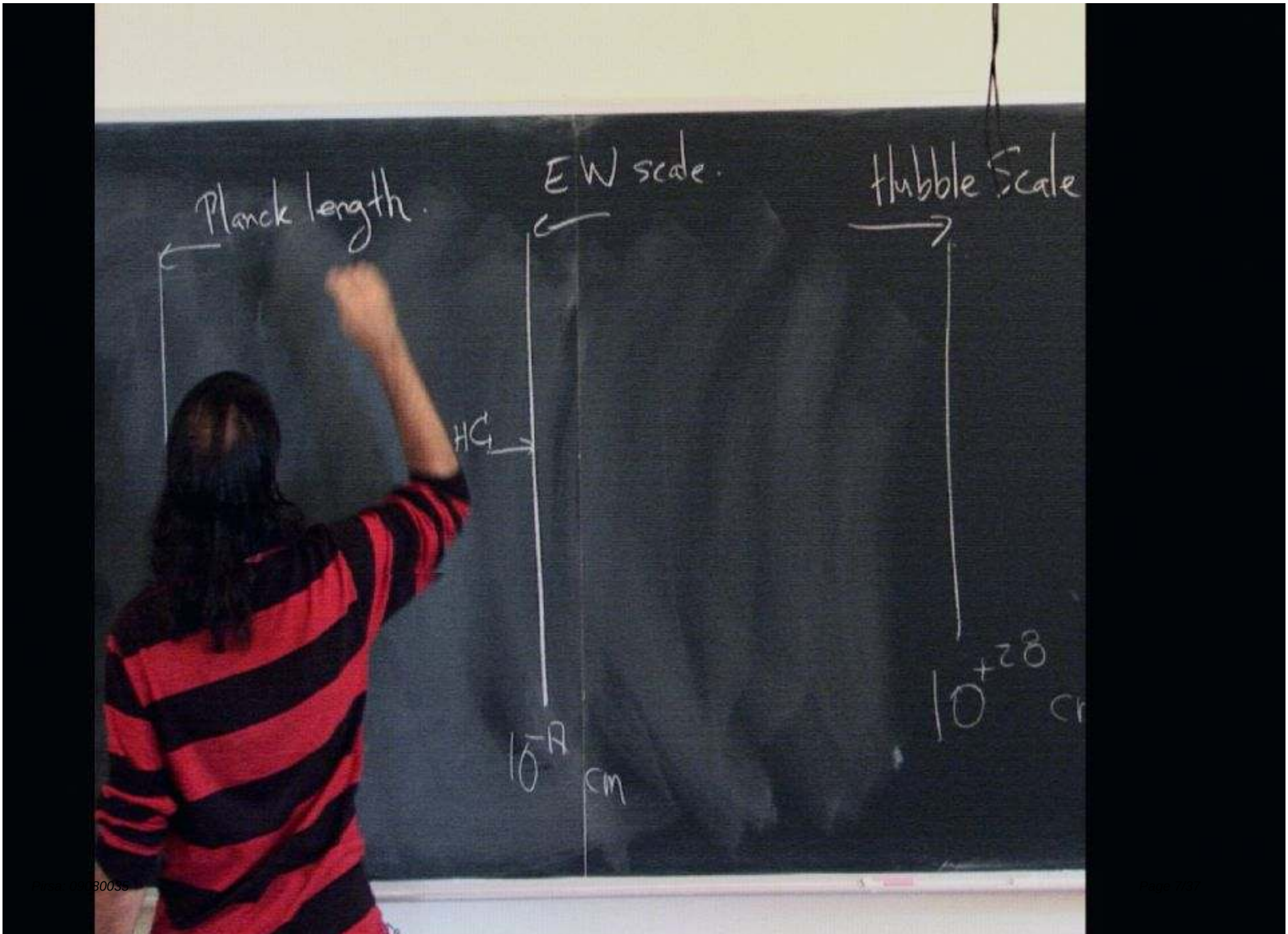

10^{-17} cm
10^{+28} cm
Size

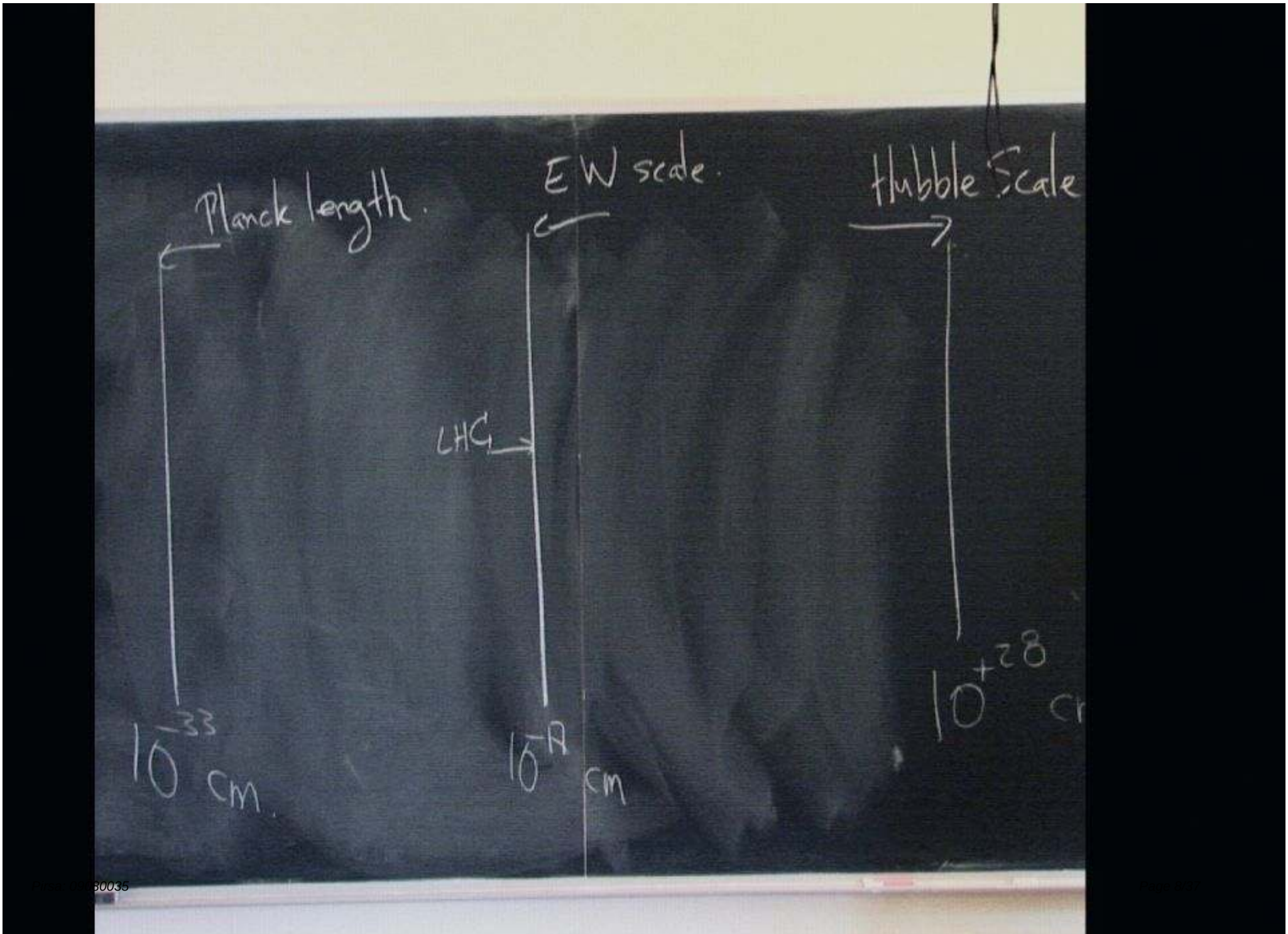

10^{-8} cm
10^{2} cm
10^{13} cm
10^{22} cm.
Galaxies.
10^{+28} cm
Size

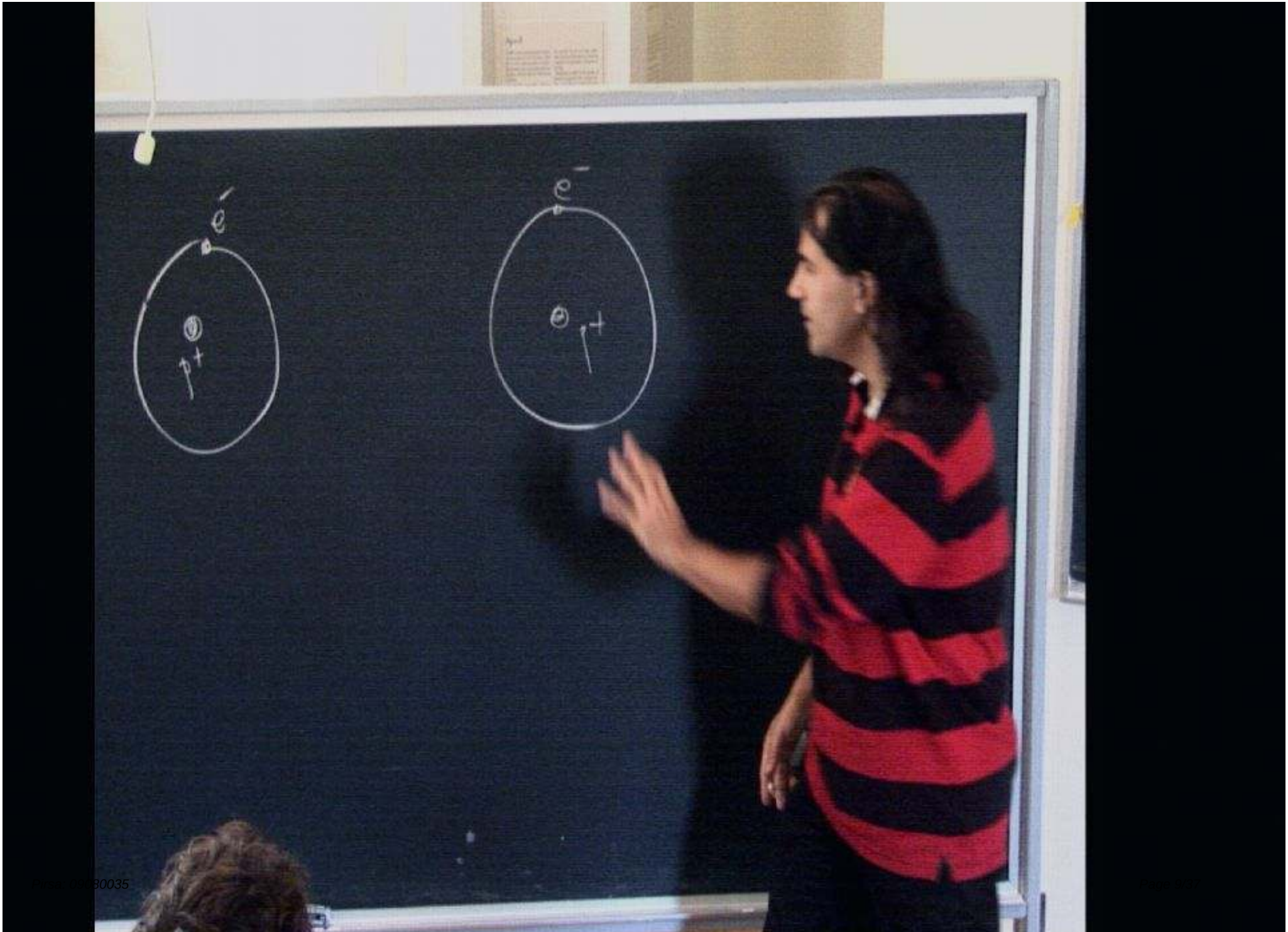

Hubble Scale.
10^22 cm.
Galaxies
10^+28 cm
Size of Uni
10^13 cm
10^-8 cm

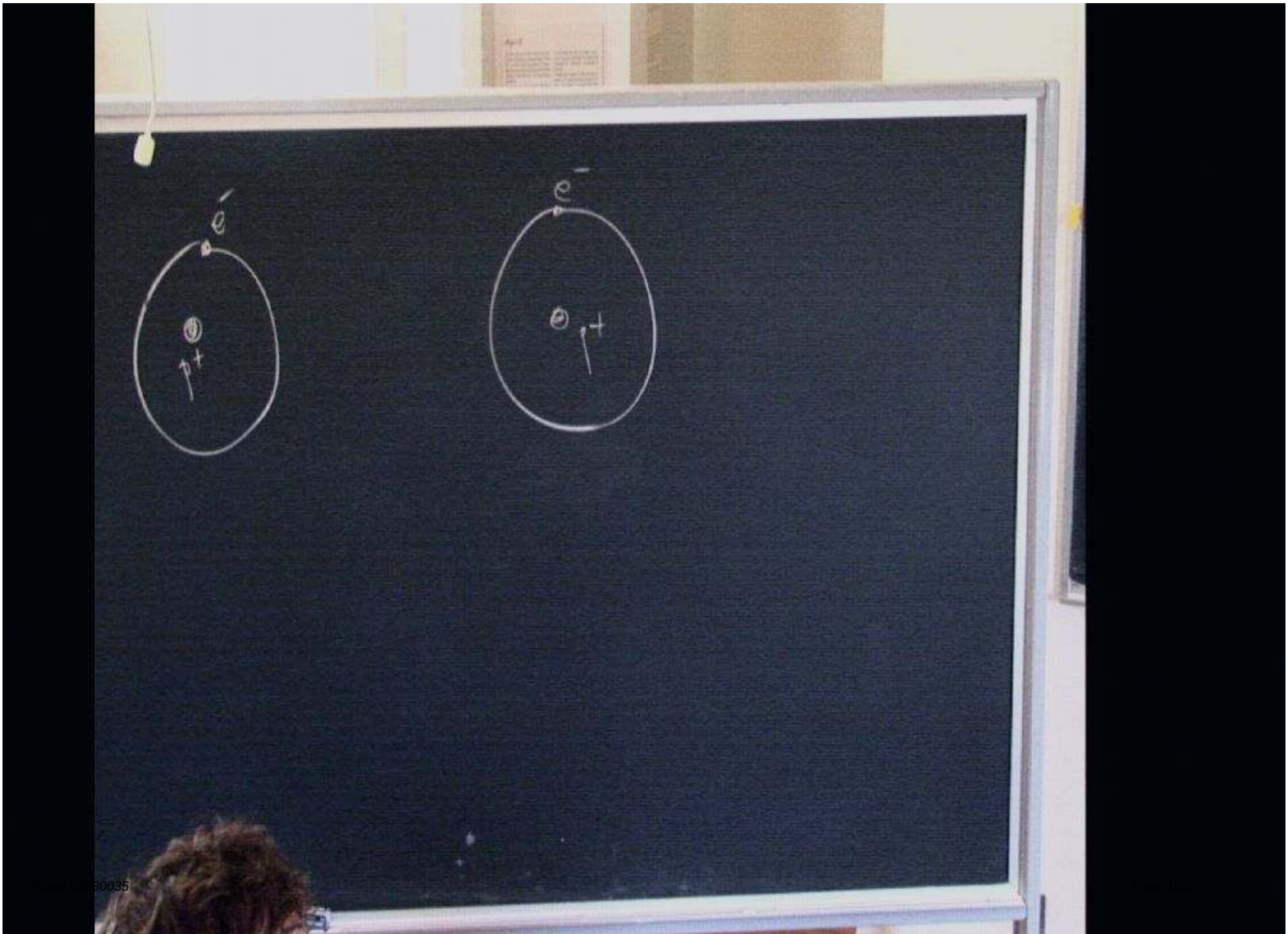

Hubble Scale.
LHC
10^{-17} cm
10^{-16} cm
10^{-15} cm
10^{-3} cm
10^{-1} cm
10^{22} cm
10^{+28} cm


EW scale.
Hubble Scale.
LHC
10^{-18} cm
10^{+28} cm
Size of Universe

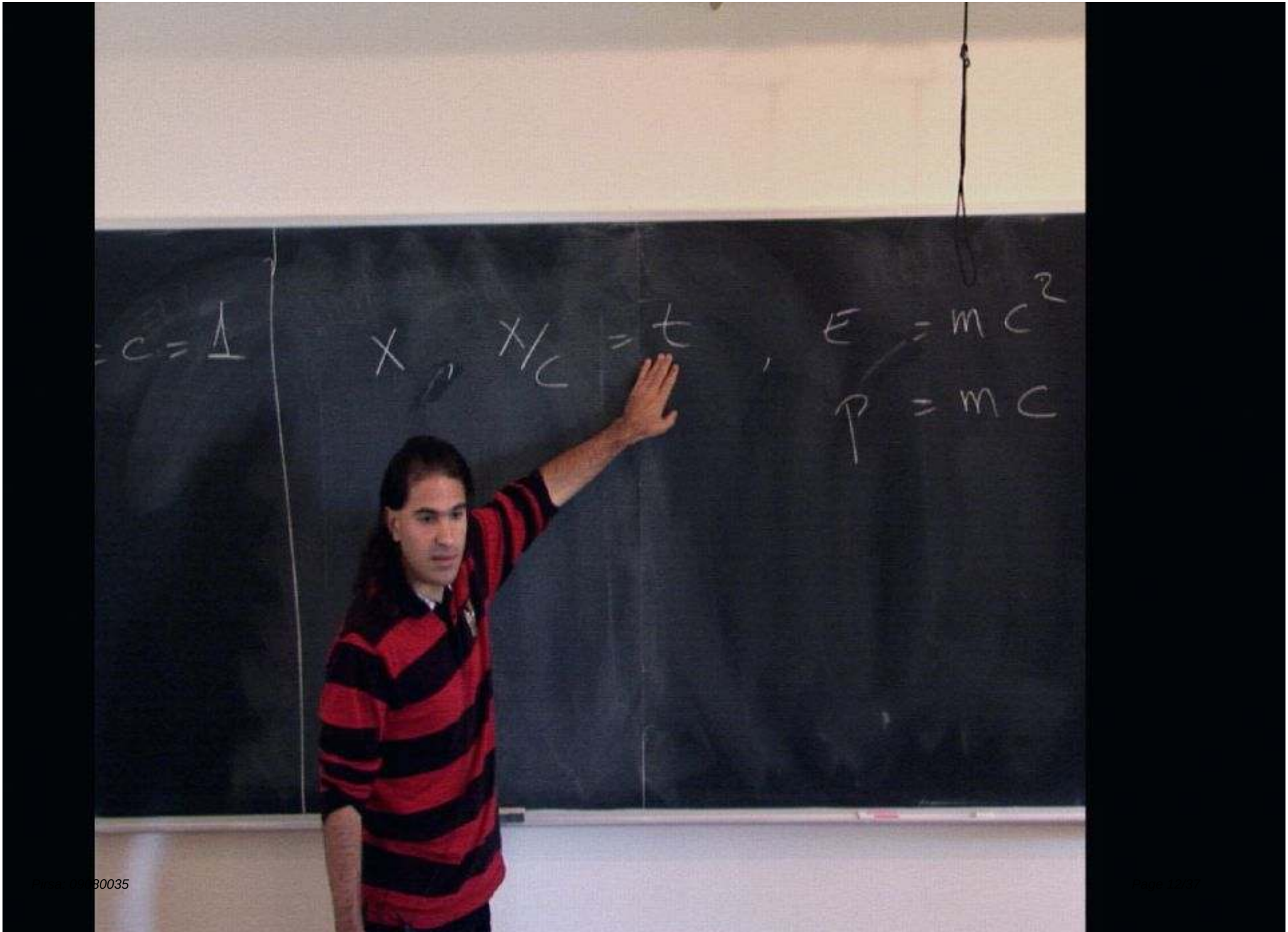

Planck length.
EW scale.
Hubble Scale
HC
10^{-A} cm
10^{+28}

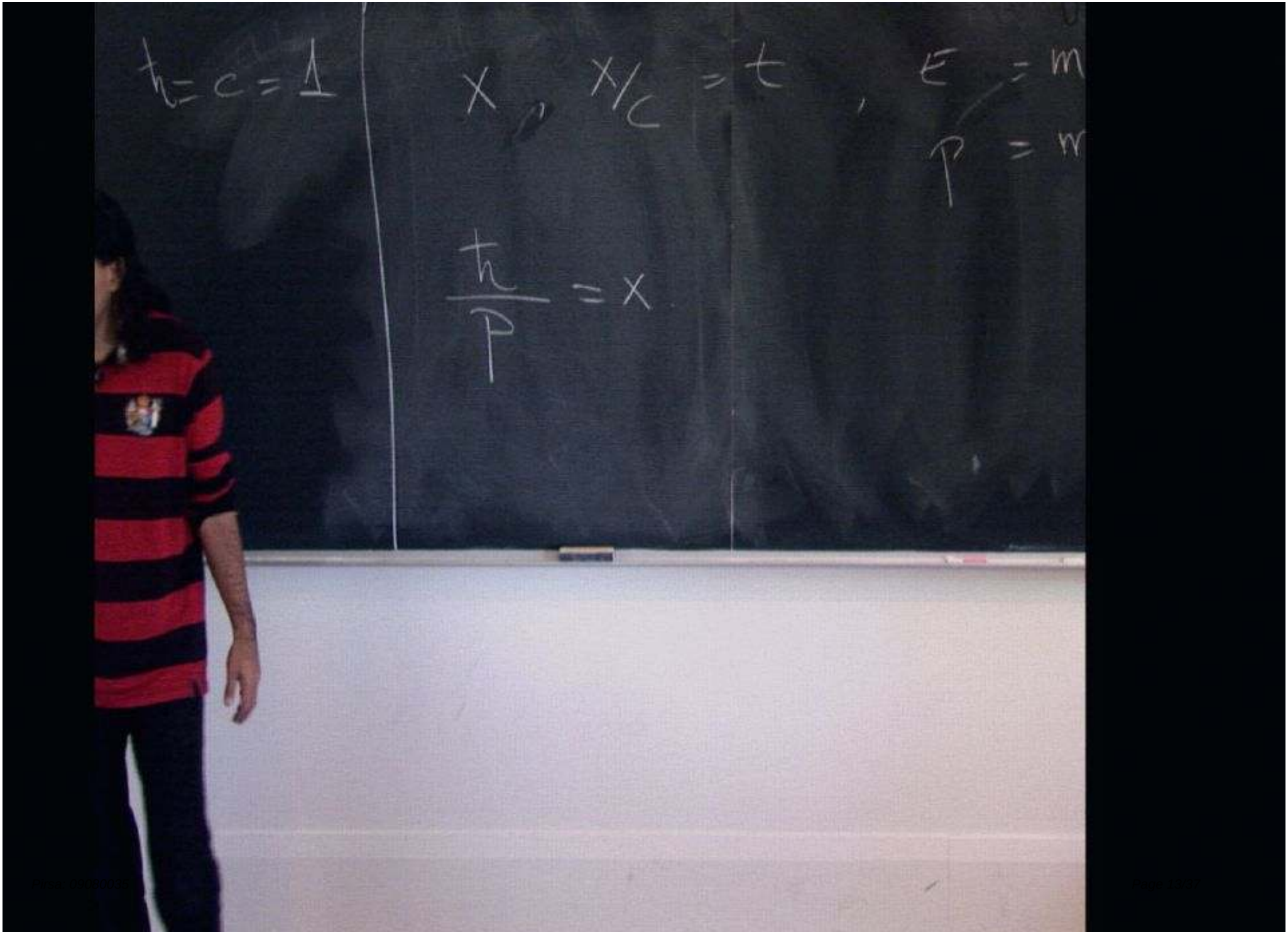

Planck length.
EW scale.
Hubble Scale
LHC
10^{-33} cm.
10^{-18} cm
10^{+28} cm

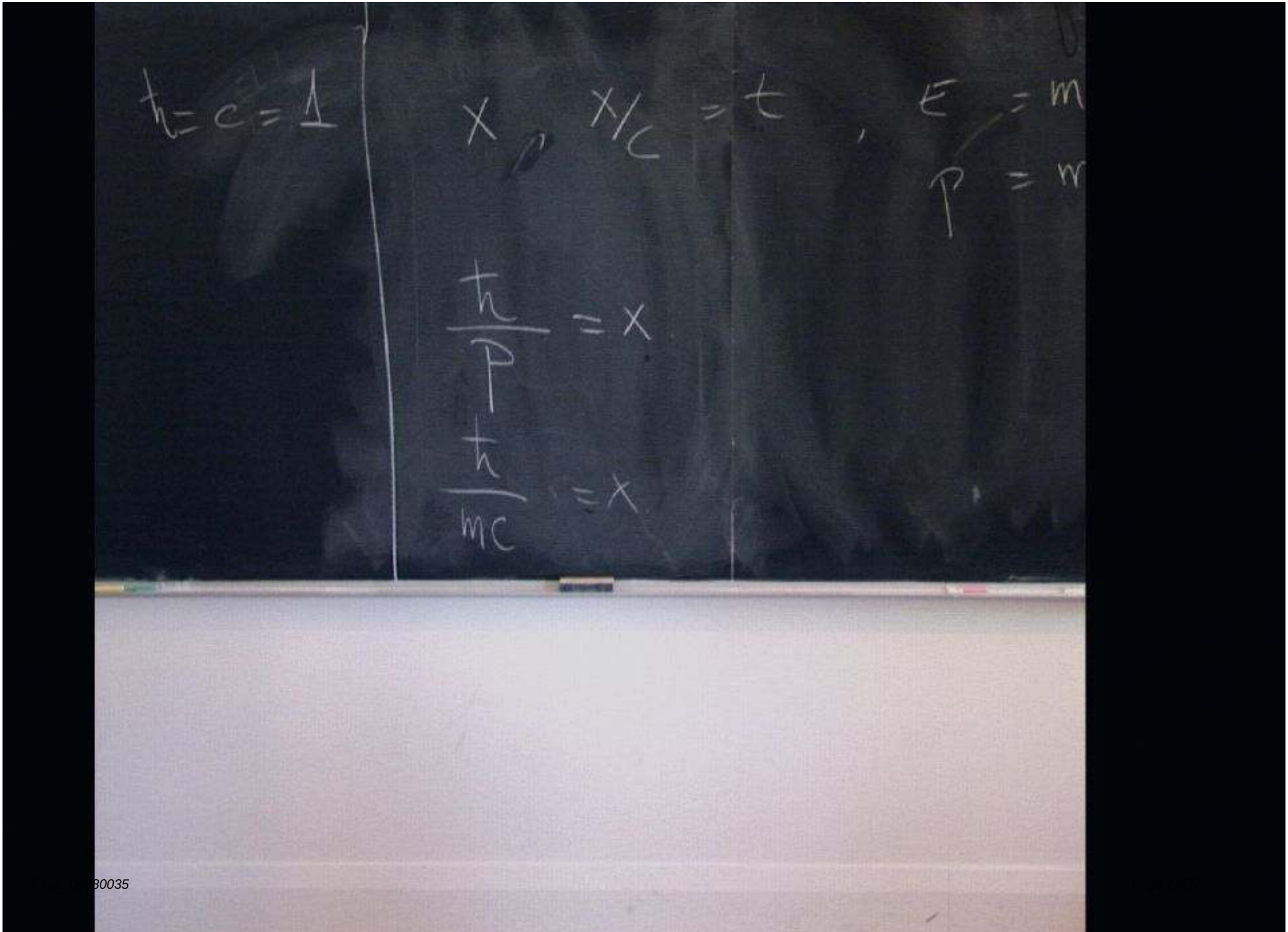

e⁻
p+
e⁻
p+

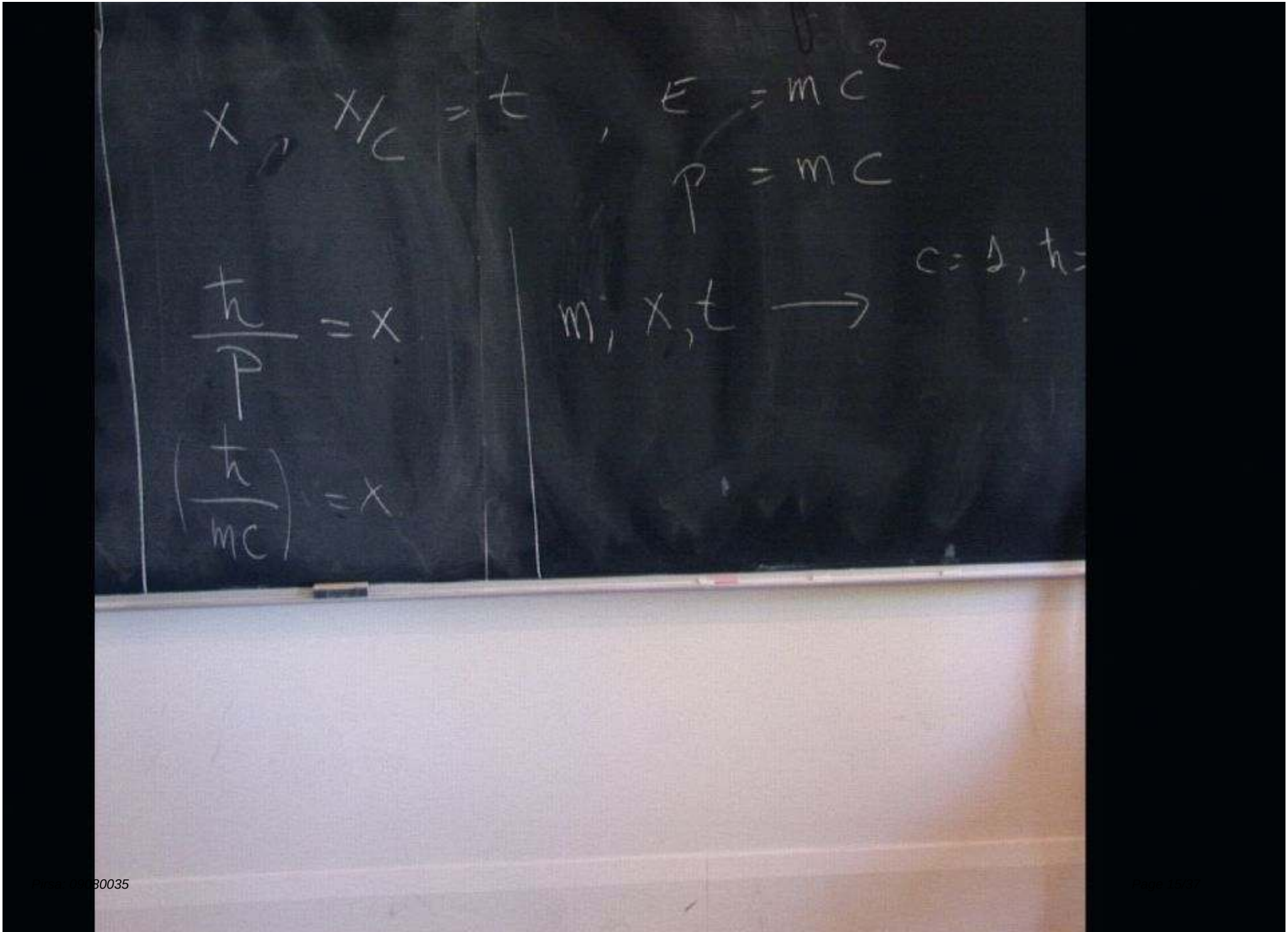

e⁻
p+
e⁻
p+

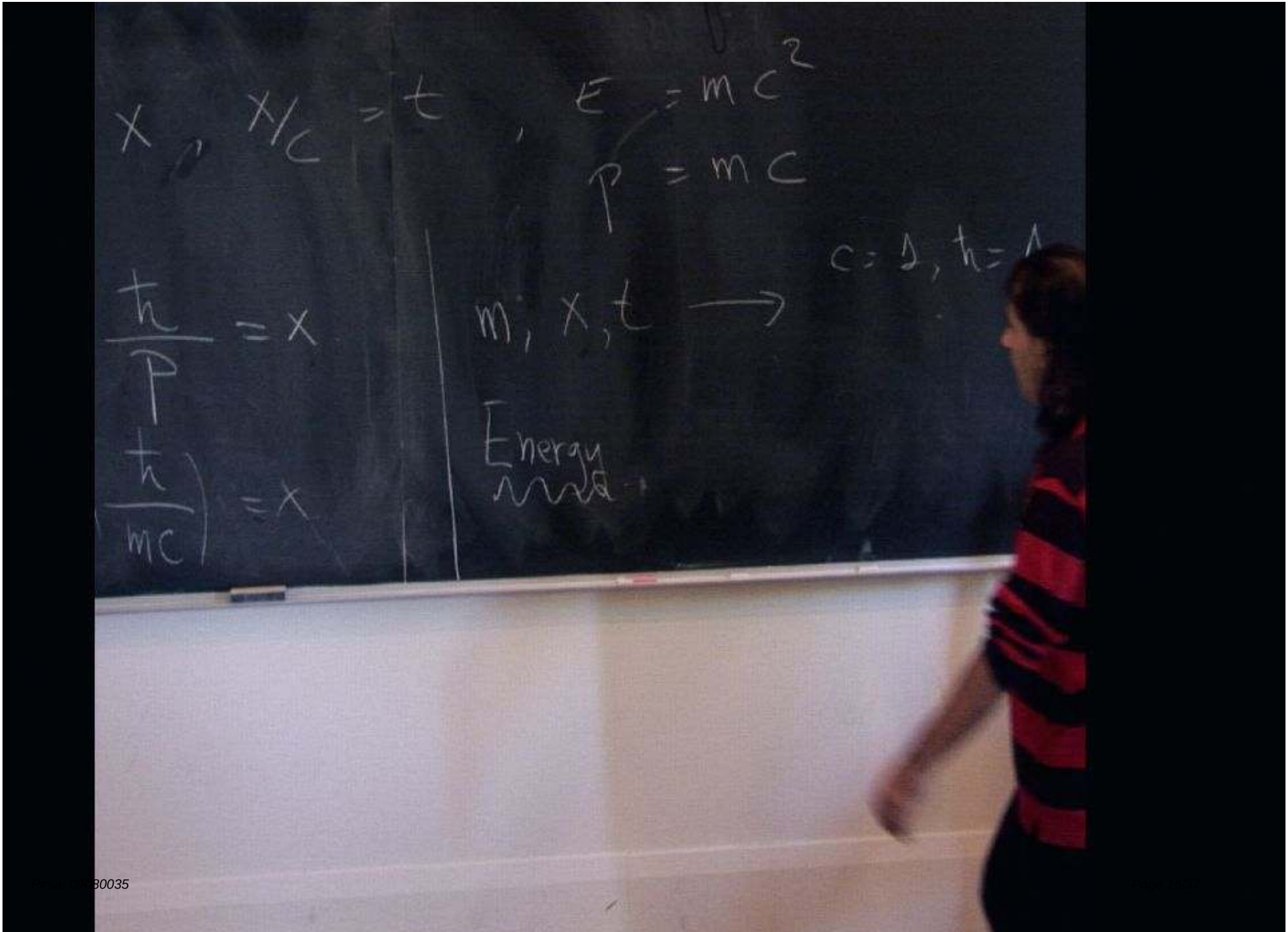
30035

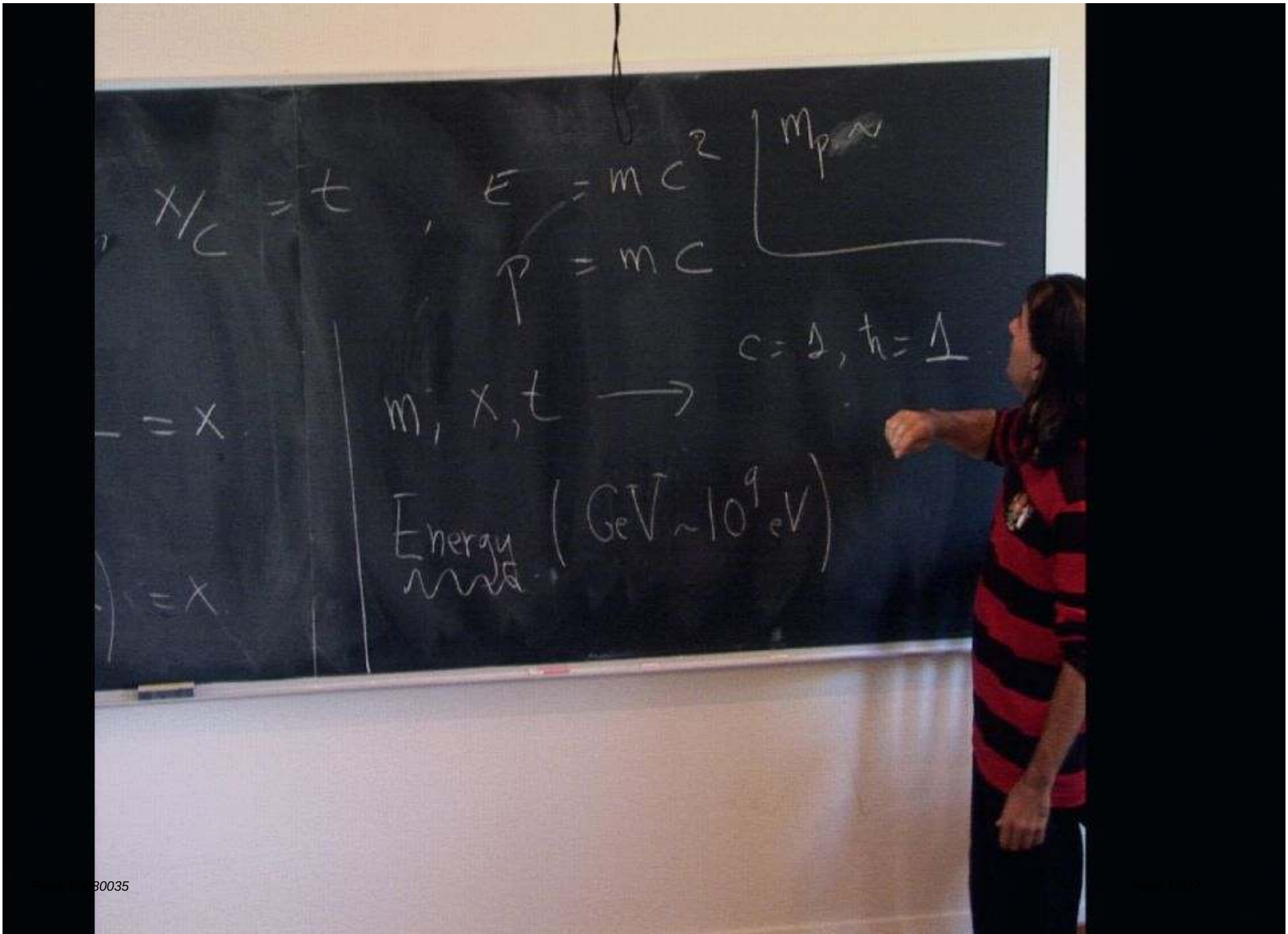

c = 1
x₀, x/c = t
E = mc²
p = mc

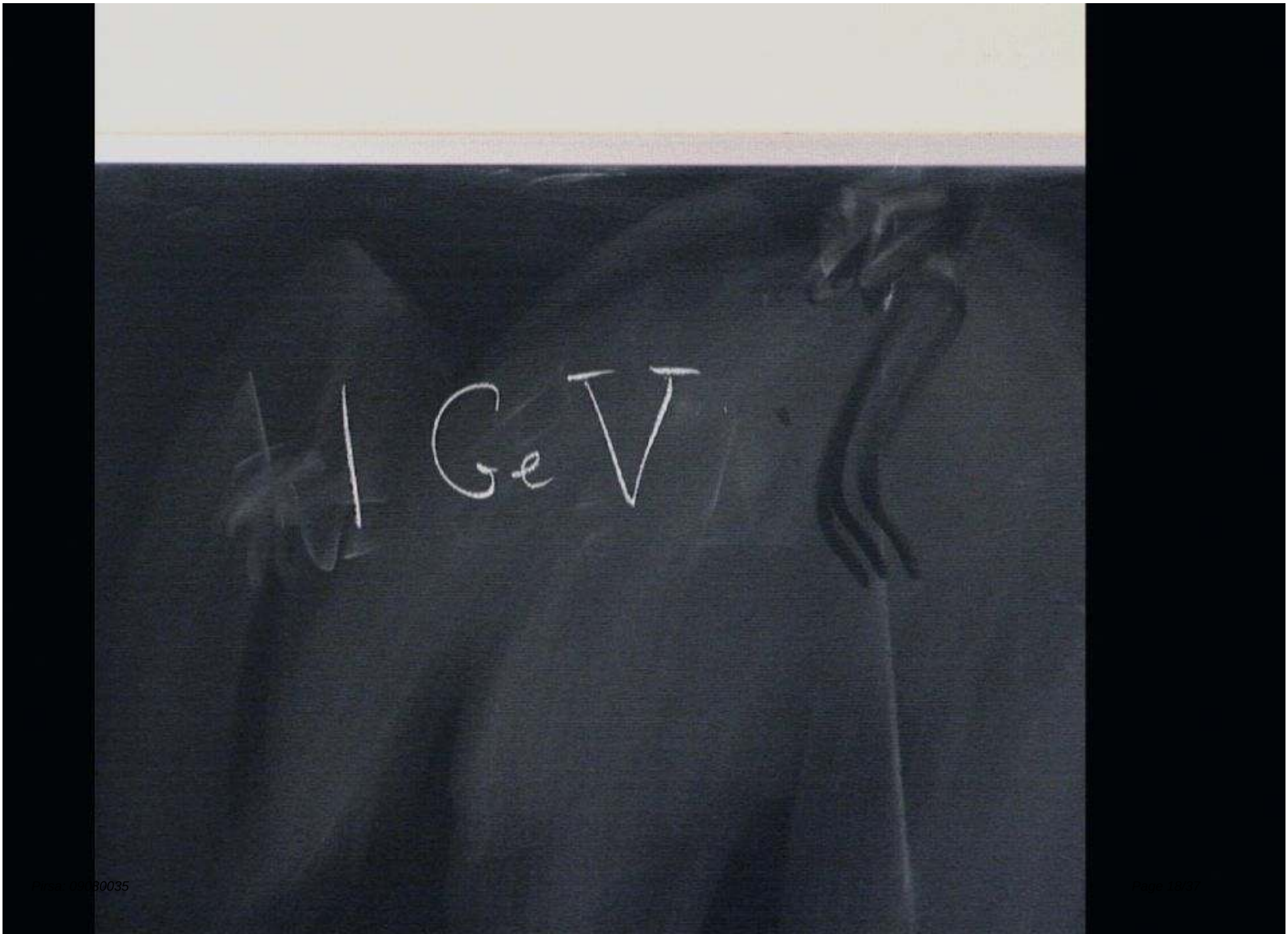

$\hbar = c = 1$
$x, \; x/c = t, \; E = m$
$p = m$
$\frac{\hbar}{p} = x$

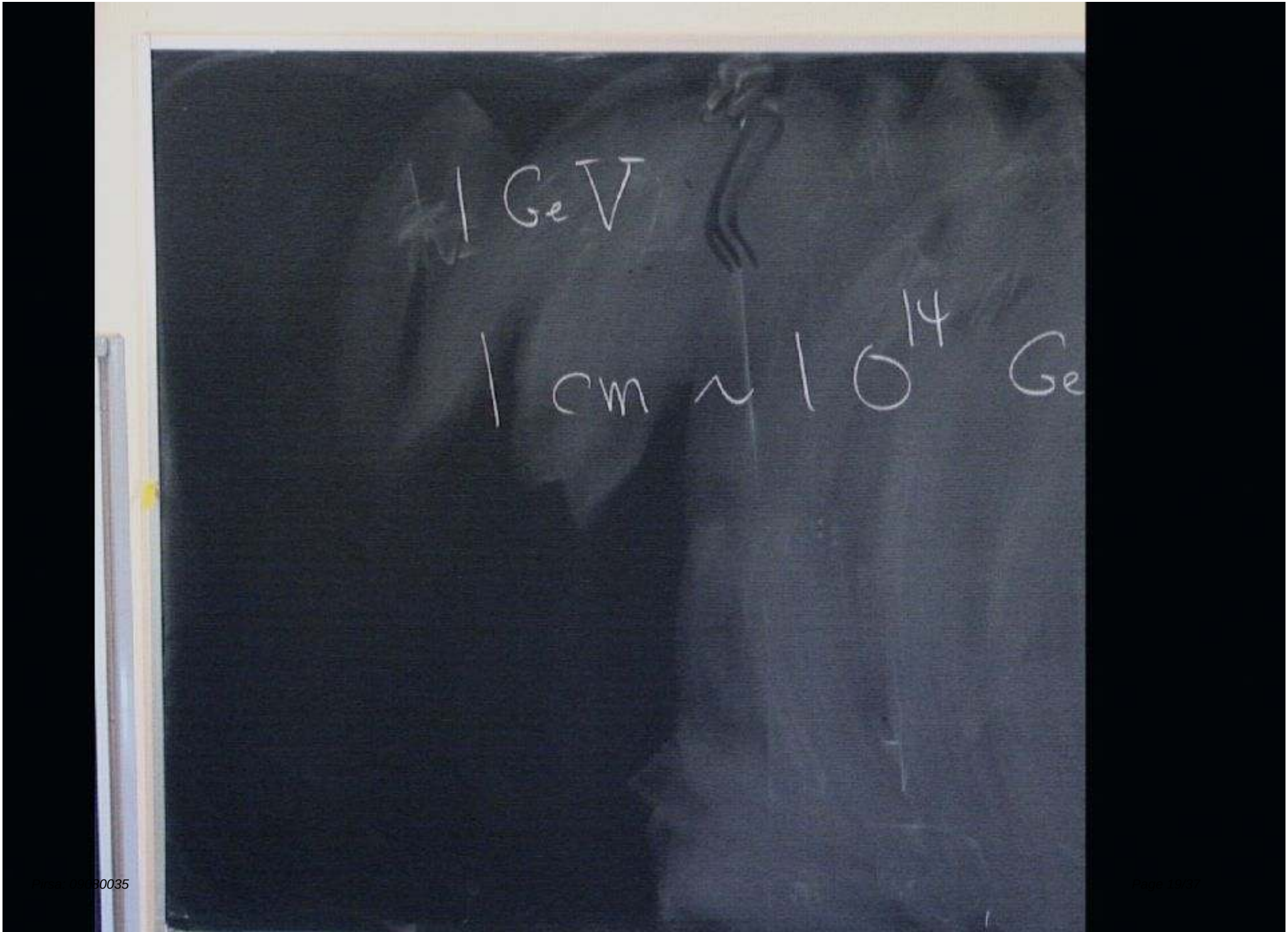

$\hbar = c = 1$
$x, \; x/c = t, \; E = m$
$p = m$
$\frac{\hbar}{p} = x$
$\frac{\hbar}{mc} = x$

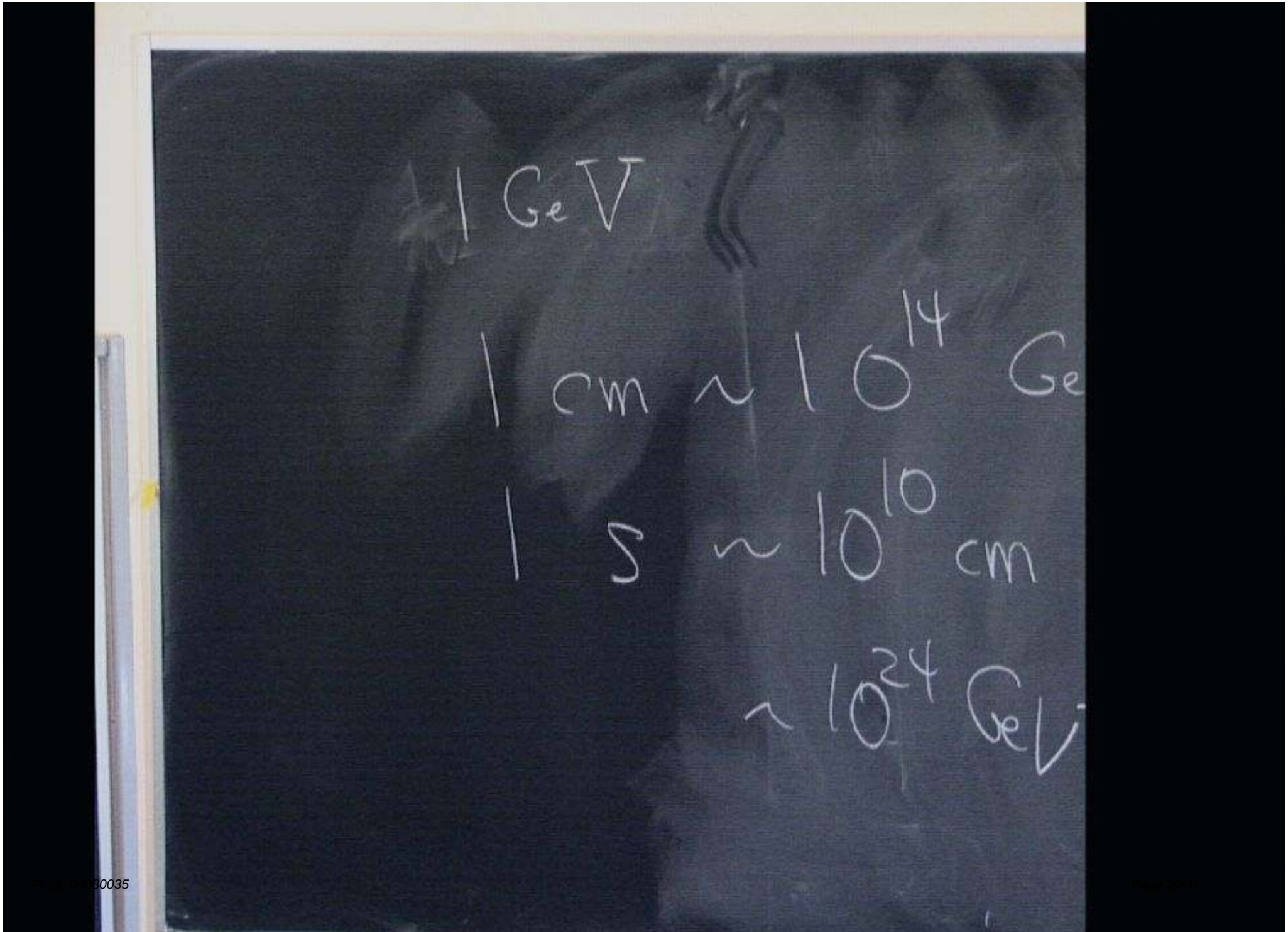

x, x/c = t
E = mc²
P = mc
h/P = x
(h/mc) = x
m; x, t ⟶
c = 1, h =

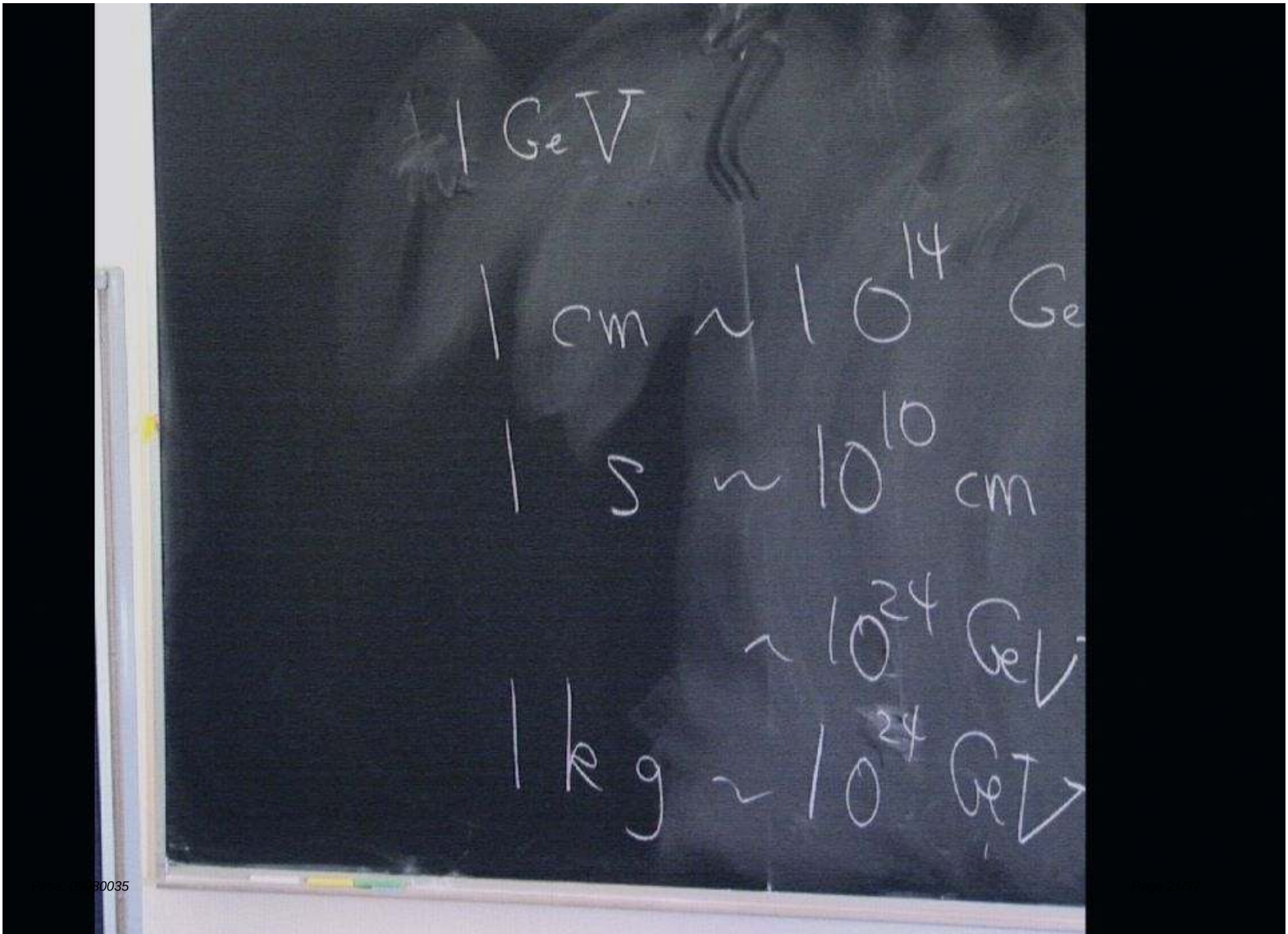

$x, x/c = t$
$E = mc^2$
$p = mc$
$c = 1, \hbar = 1$
$\frac{\hbar}{p} = x$
$m; x, t \longrightarrow$
Energy
$\left(\frac{\hbar}{mc}\right) = x$

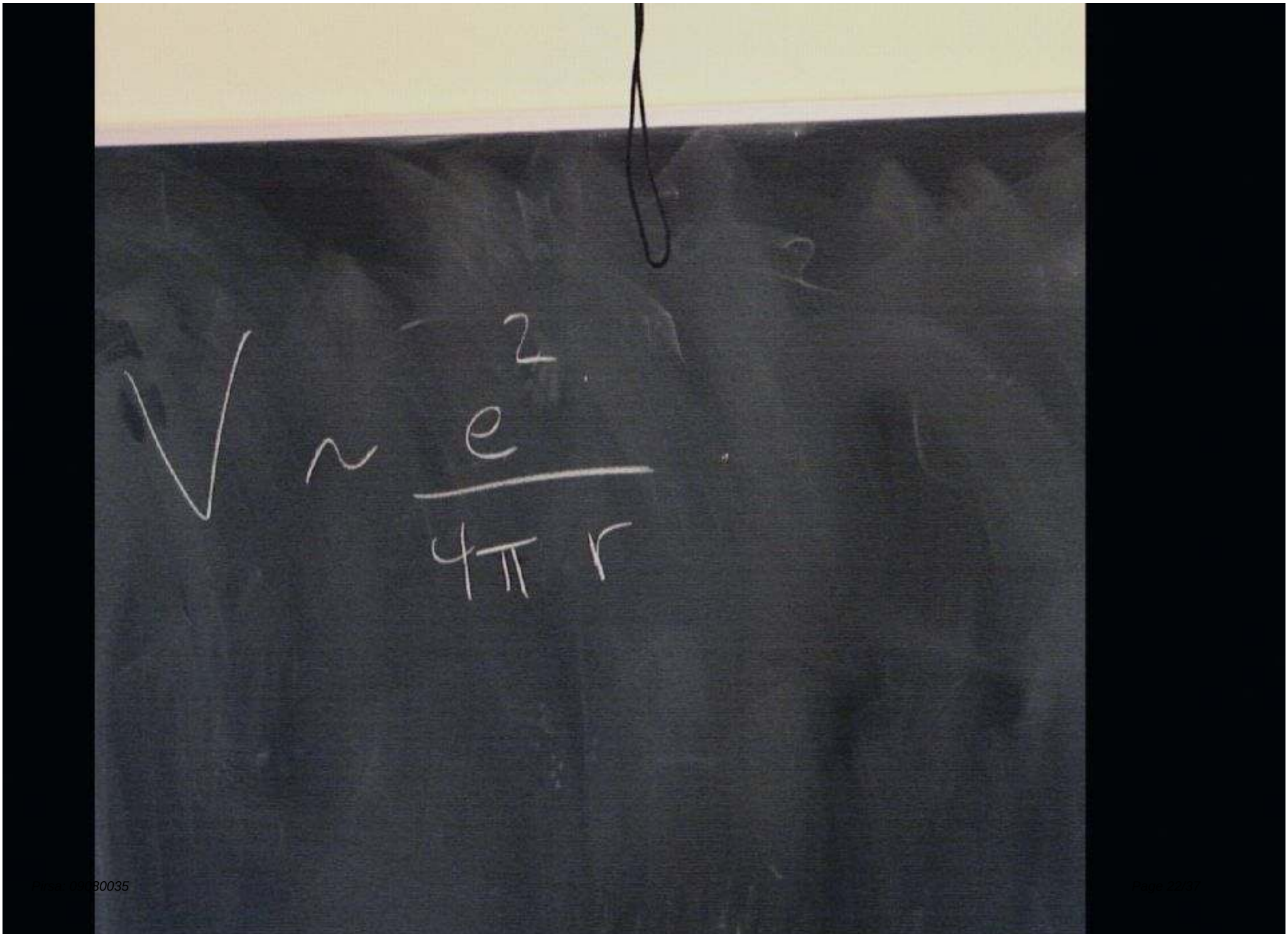

$x/c = t$
$E = mc^2$
$p = mc$
$m_p \sim$
$c = 1, \hbar = 1$
$m, x, t \longrightarrow$
Energy (GeV $\sim 10^9$ eV)

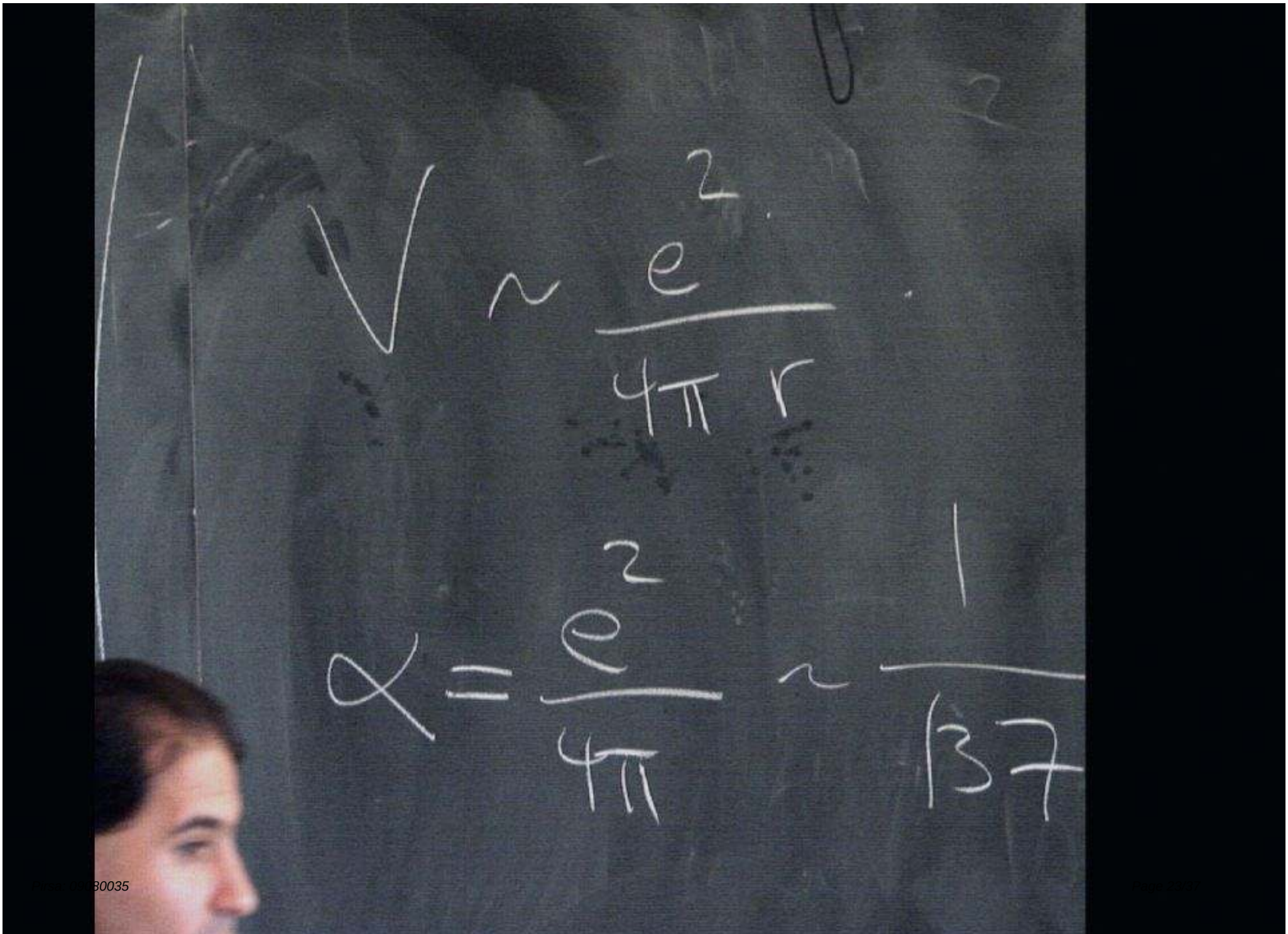

1 GeV

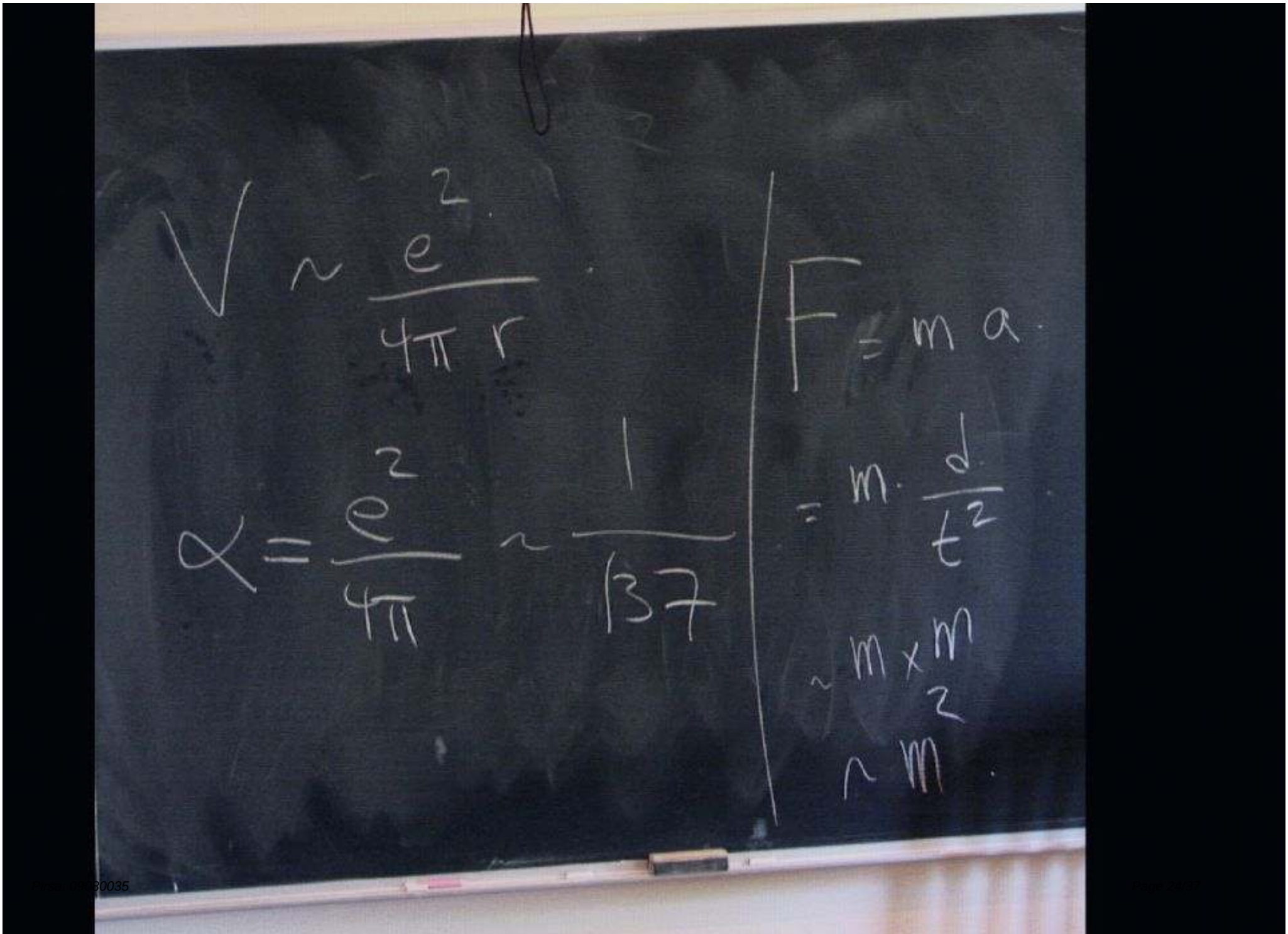

1 GeV
1 cm ~ 10^14 Ge

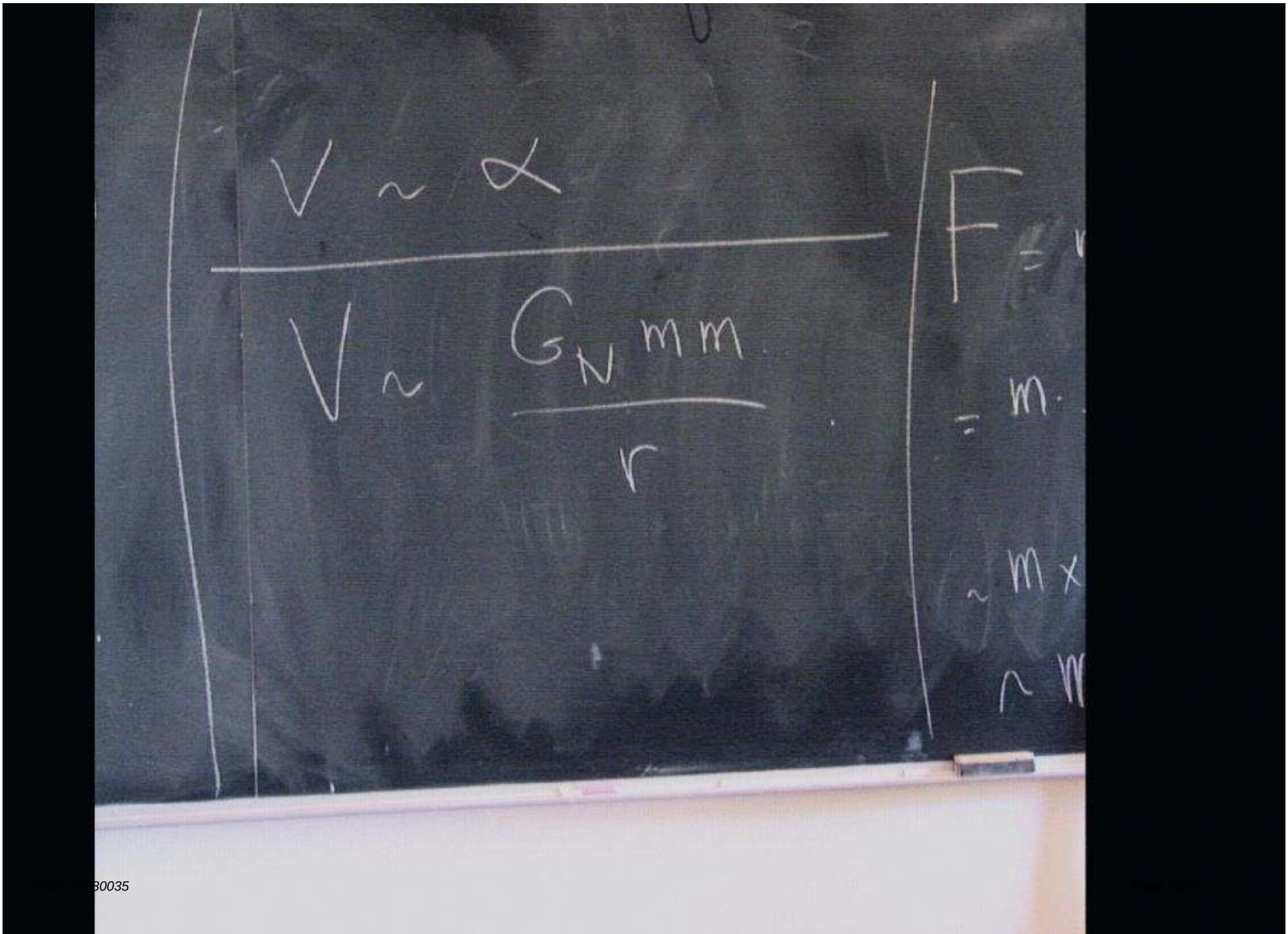

1 GeV
1 cm ~ 10^14 Ge
1 s ~ 10^10 cm
~ 10^24 GeV

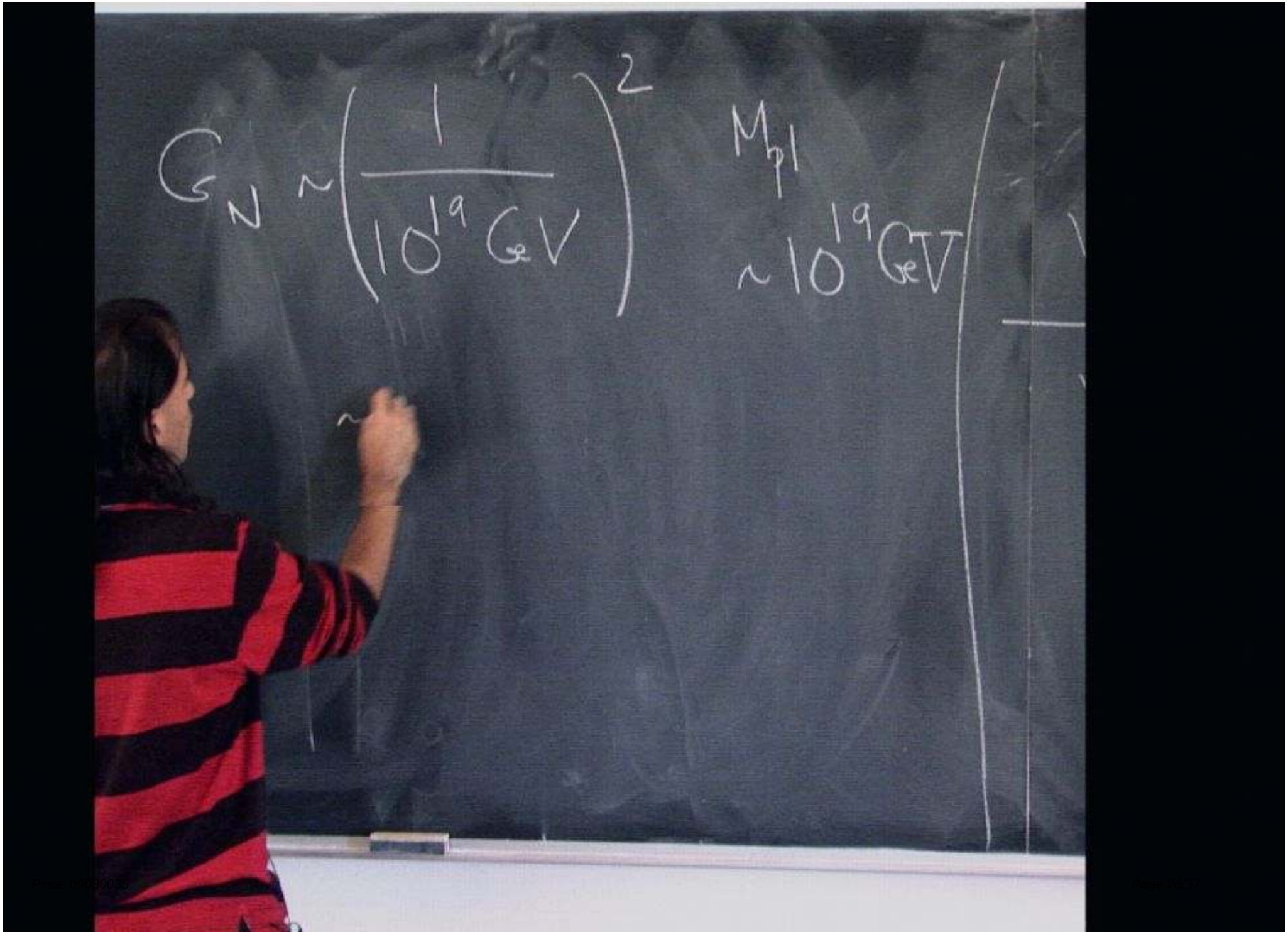

1 GeV
1 cm ~ 10^14 Ge
1 s ~ 10^10 cm
~ 10^24 GeV
1 kg ~ 10^24 GeV

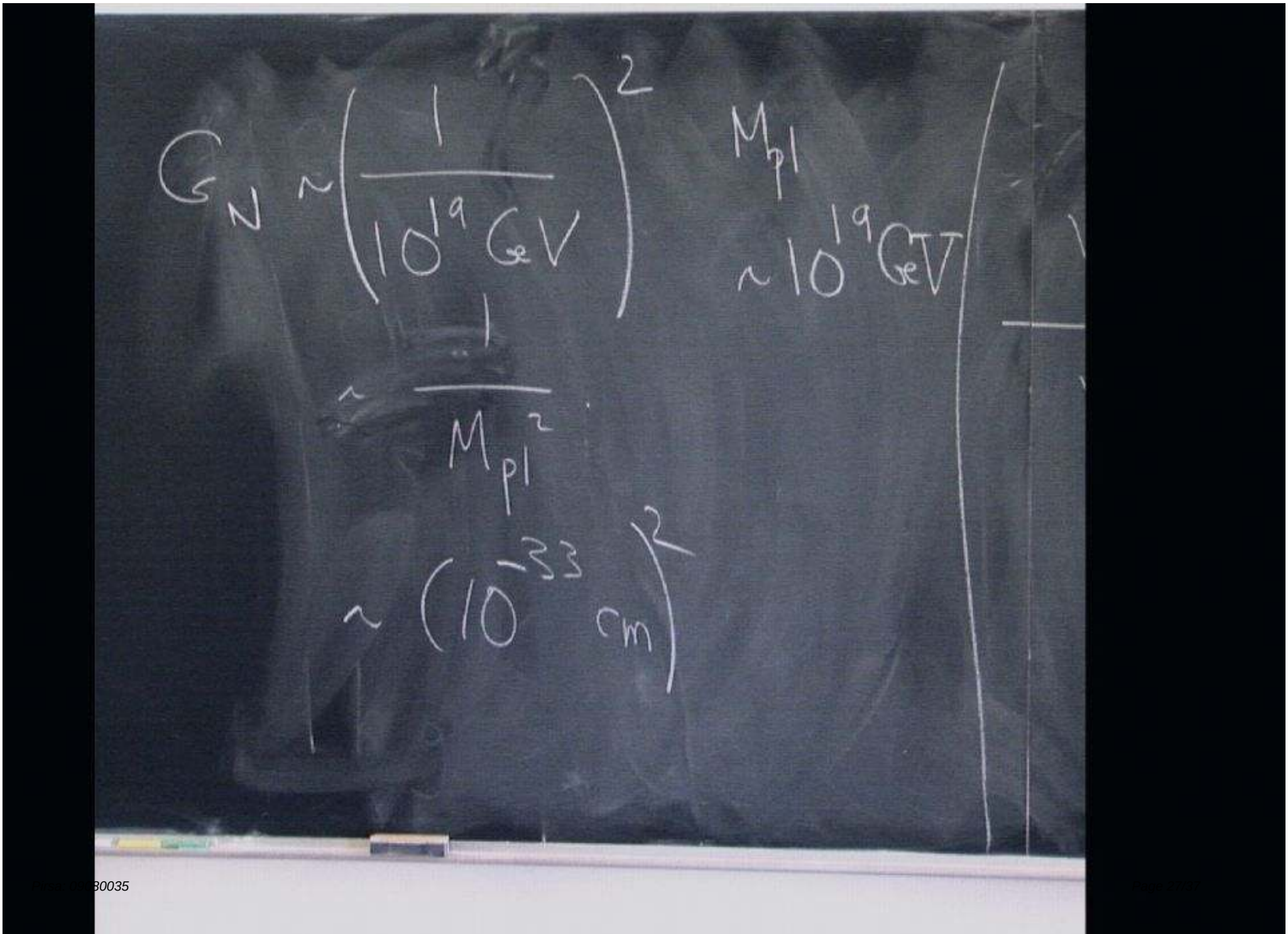

$V \sim \frac{e^2}{4\pi r}$

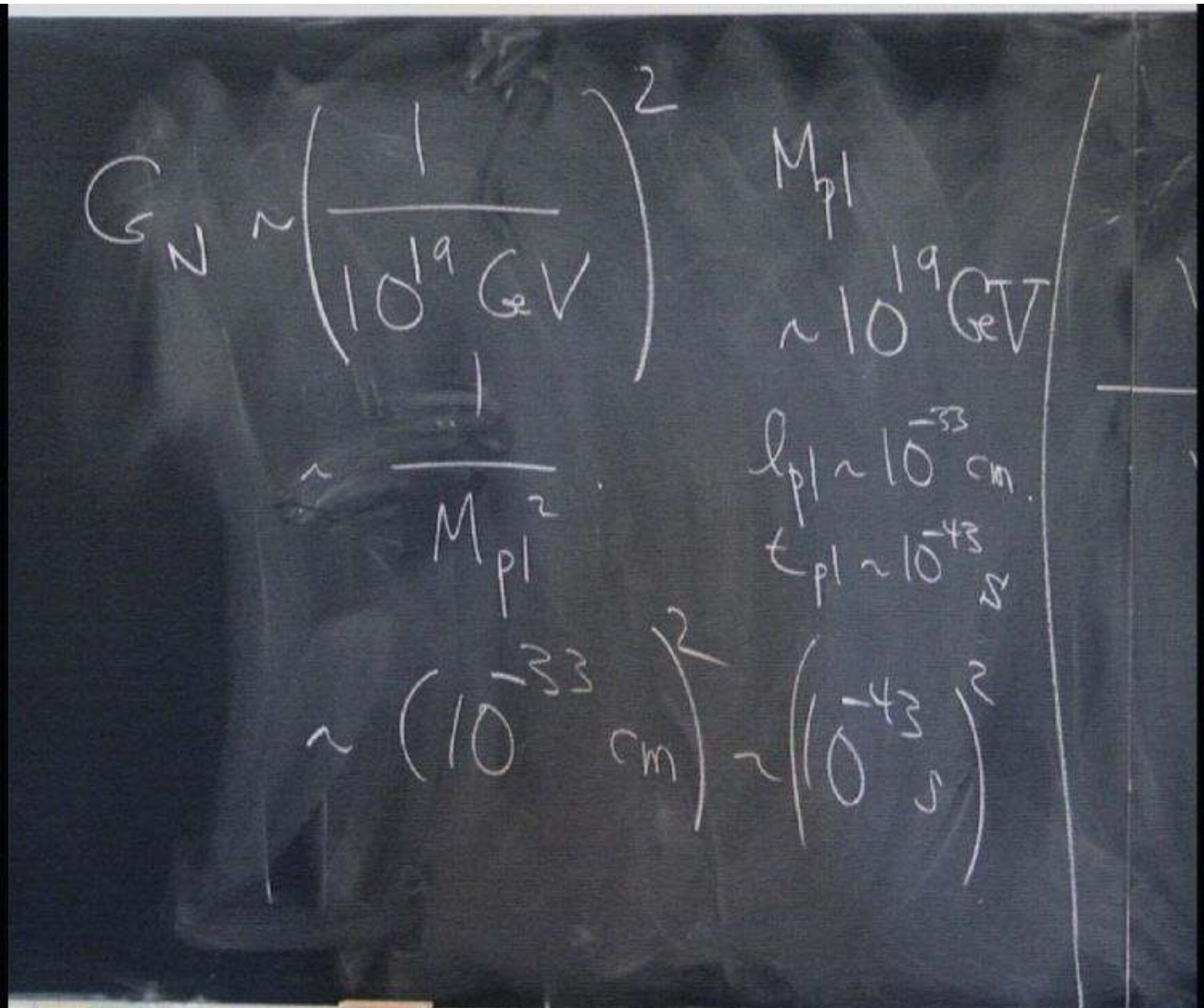

V ~ e^2 / 4πr
α = e^2 / 4π ~ 1/137


$V \sim \frac{e^2}{4\pi r}$
$\alpha = \frac{e^2}{4\pi} \sim \frac{1}{137}$
$F = ma$
$= m \cdot \frac{d}{t^2}$
$\sim m \times \frac{m}{2}$
$\sim m$


$V \sim \alpha$
$V \sim \frac{G_N m m}{r}$
$F =$
$= m$
$\sim m x$
$\sim m$


$G_N \sim \left(\frac{1}{10^{19}\,GeV}\right)^2$
M_{Pl}
$\sim 10^{19}\,GeV$
$\sim$


$G_N \sim \left(\frac{1}{10^{19}\,\mathrm{GeV}}\right)^2$
$M_{Pl} \sim 10^{19}\,\mathrm{GeV}$
$\sim \frac{1}{M_{Pl}^2}$
$\sim (10^{-33}\,\mathrm{cm})^2$


$G_N \sim \left(\frac{1}{10^{19}\,\mathrm{GeV}}\right)^2$
$M_{pl} \sim 10^{19}\,\mathrm{GeV}$
$\sim \frac{1}{M_{pl}^2}$
$\ell_{pl} \sim 10^{-33}\,\mathrm{cm}$
$t_{pl} \sim 10^{-43}\,\mathrm{s}$
$\sim (10^{-33}\,\mathrm{cm})^2 \sim (10^{-43}\,\mathrm{s})^2$

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$(G_N \cdot E^2)$

$V \sim \alpha$

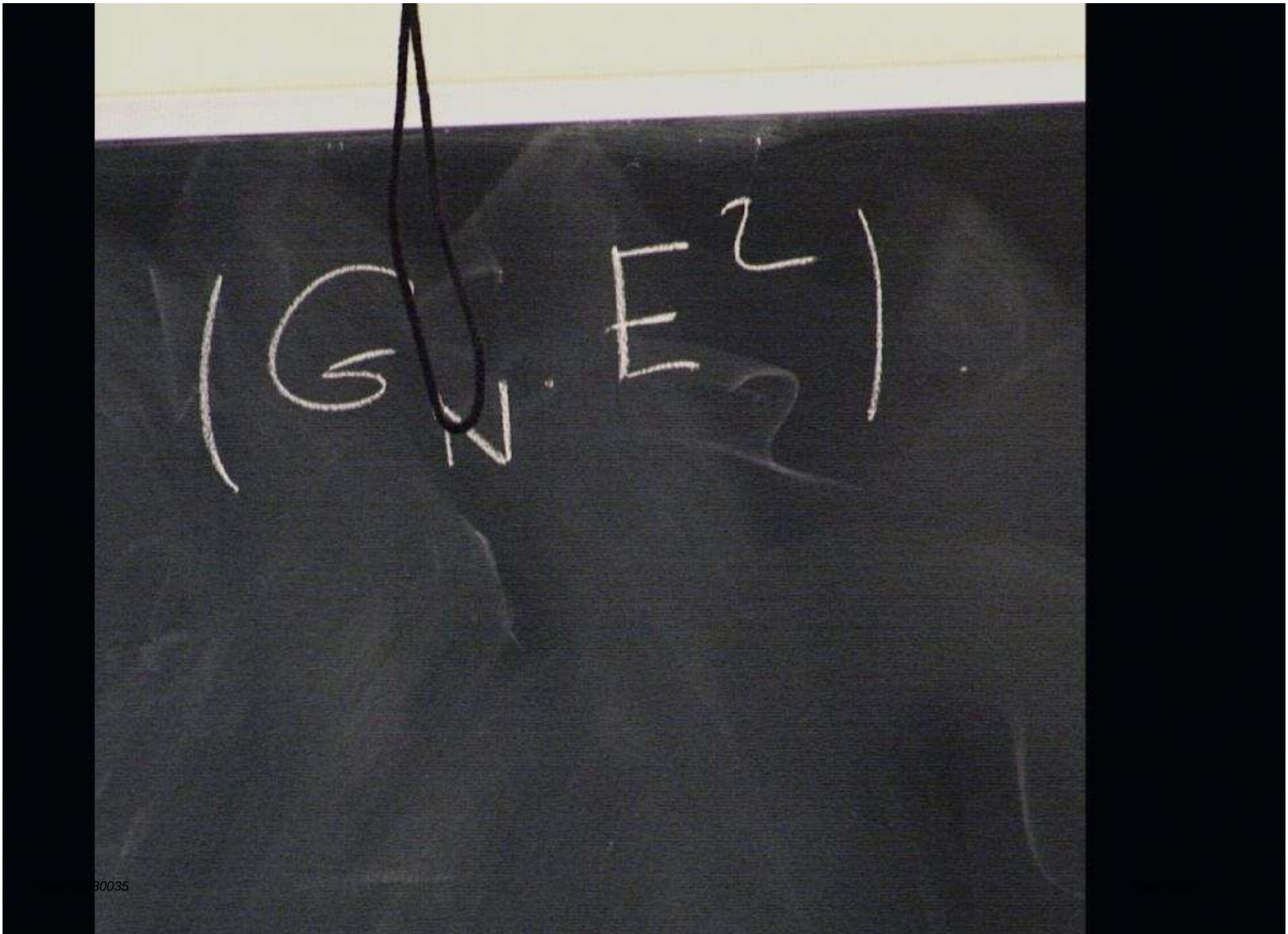
$V \sim \frac{G_N m m}{r}$

$F = m a$

$= m \cdot \frac{d}{t^2}$

$\sim m \times \frac{m}{2}$

$\sim m$


(G, E2)

$(G_N \cdot E^2)$ ← dimless strength @ E_n. E

α

$\frac{G_N m m}{r}$

$F = ma$

$= m \cdot \frac{d}{t^2}$

$\sim m \times m$

$m_p \sim \text{GeV}$

$G_N \sim \frac{1}{M_{pl}^2}$, $M_{pl} \sim 10^{19}\,\text{GeV}$

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$$m_p \sim \text{GeV}$$

$$G_N \sim \frac{1}{M_{pl}^2}, \quad M_{pl} \sim 10^{19}\ \text{GeV}$$

$$\alpha \sim \frac{1}{137}$$

m_p

$$G_N \sim \frac{1}{M_{pl}^2}, \quad M_{pl} \sim 10^{19}\,\text{GeV}$$

$$\alpha \sim \frac{1}{137}$$

m_e

m_π

30035

m_p

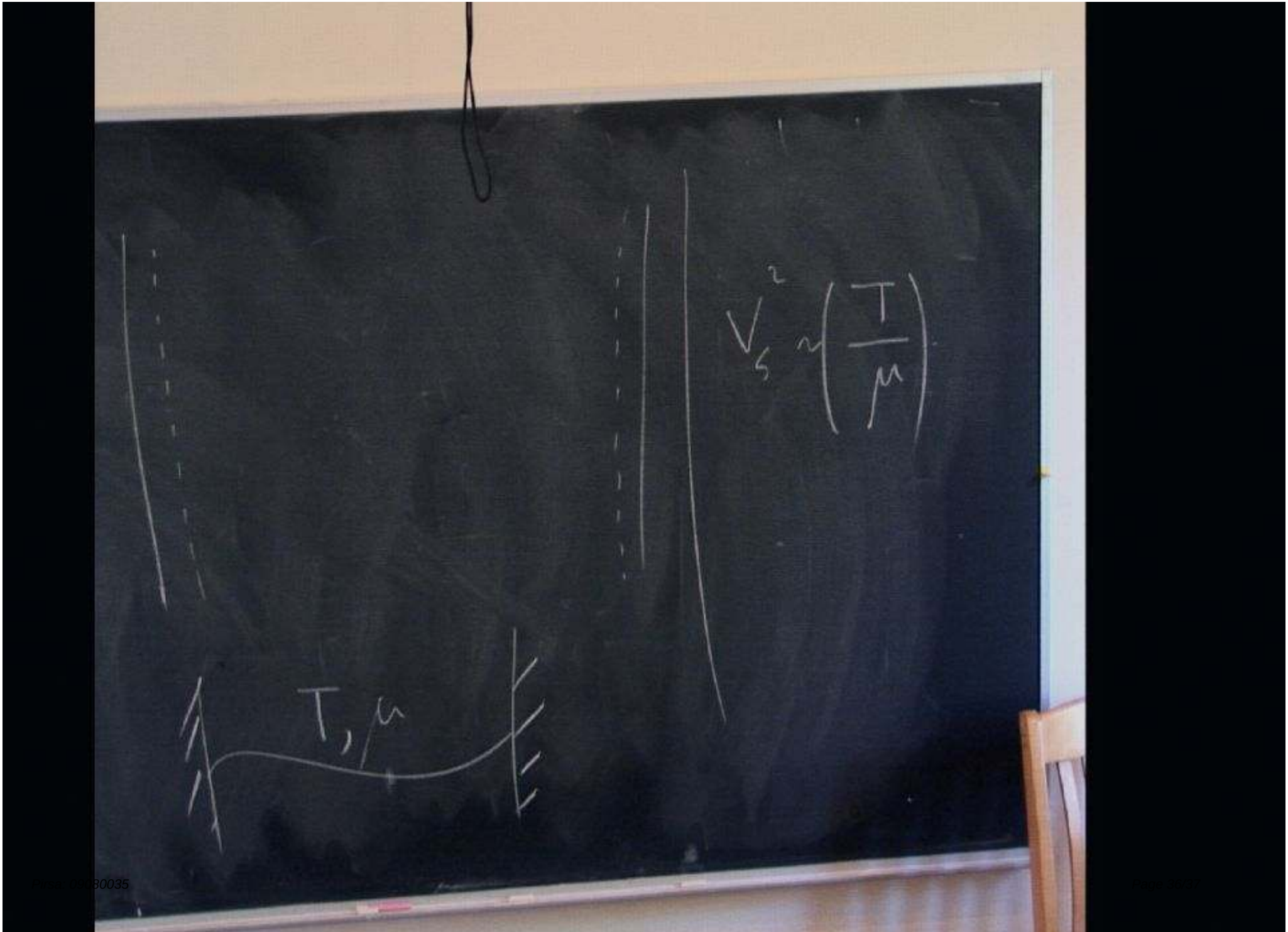
$$G_N \sim \frac{1}{M_{Pl}^2}, \quad M_{Pl} \sim 10^{19}\,\text{GeV}$$

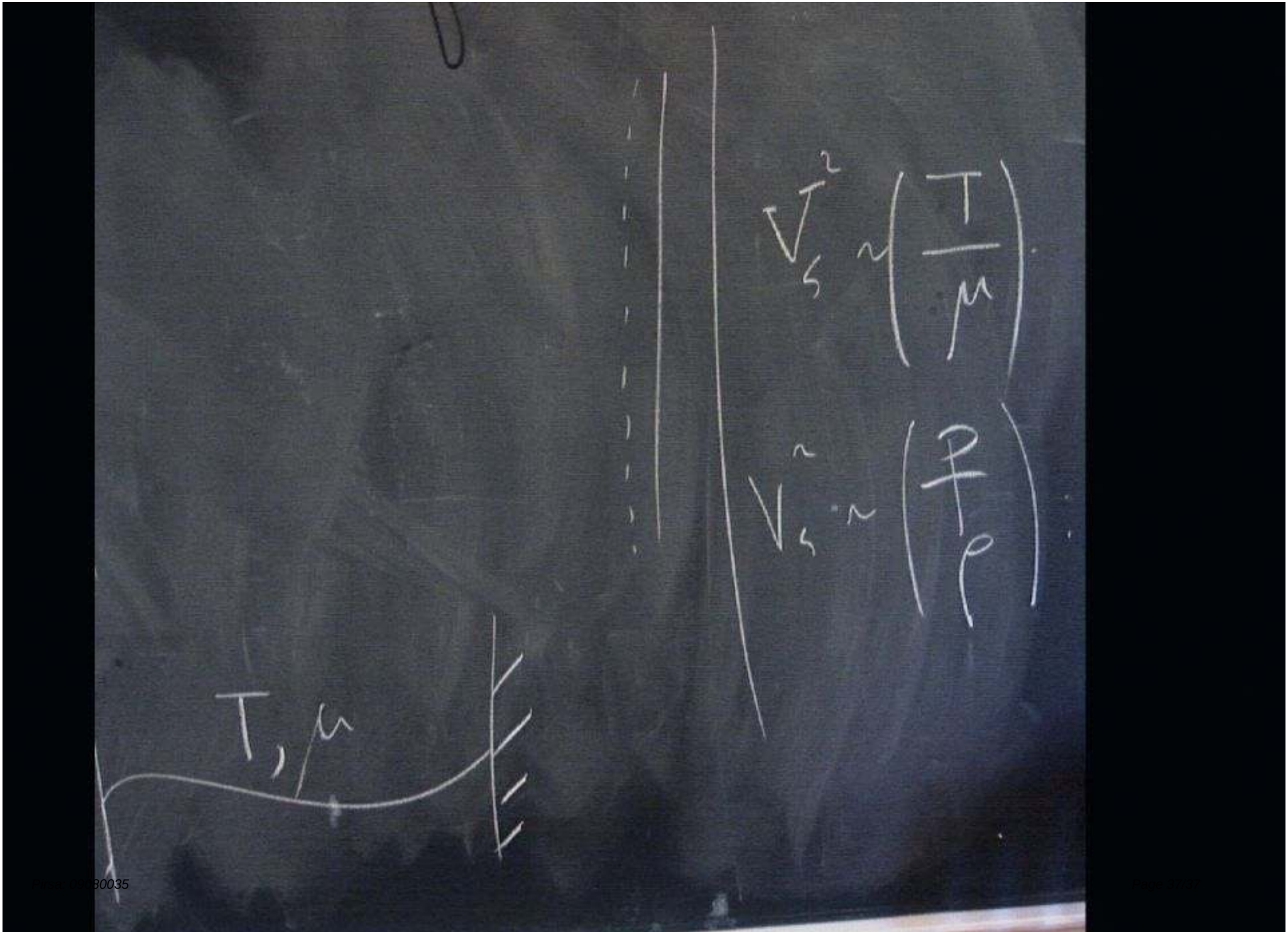
$$\alpha \sim \frac{1}{137}$$

$$m_e \sim 10^{-3}\,\text{GeV}$$

$$m_\pi \sim 10^{-1}\,\text{GeV}$$

30035


$V_s^2 \sim \left(\frac{T}{\mu}\right)$
T, μ


$V_s^2 \sim \left(\frac{T}{\mu}\right)$
$V_s \sim \left(\frac{P}{\rho}\right)$
T, μ