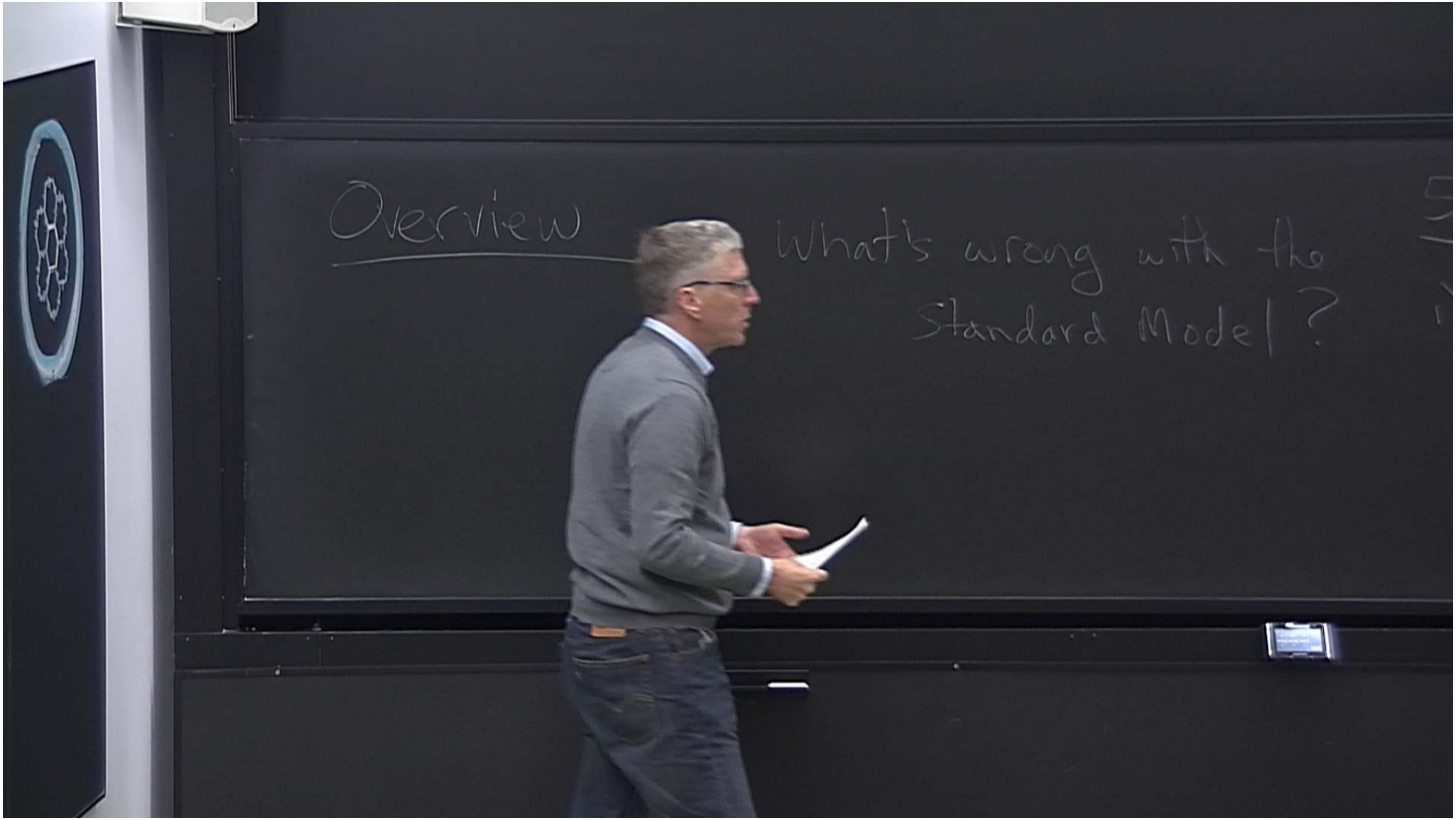
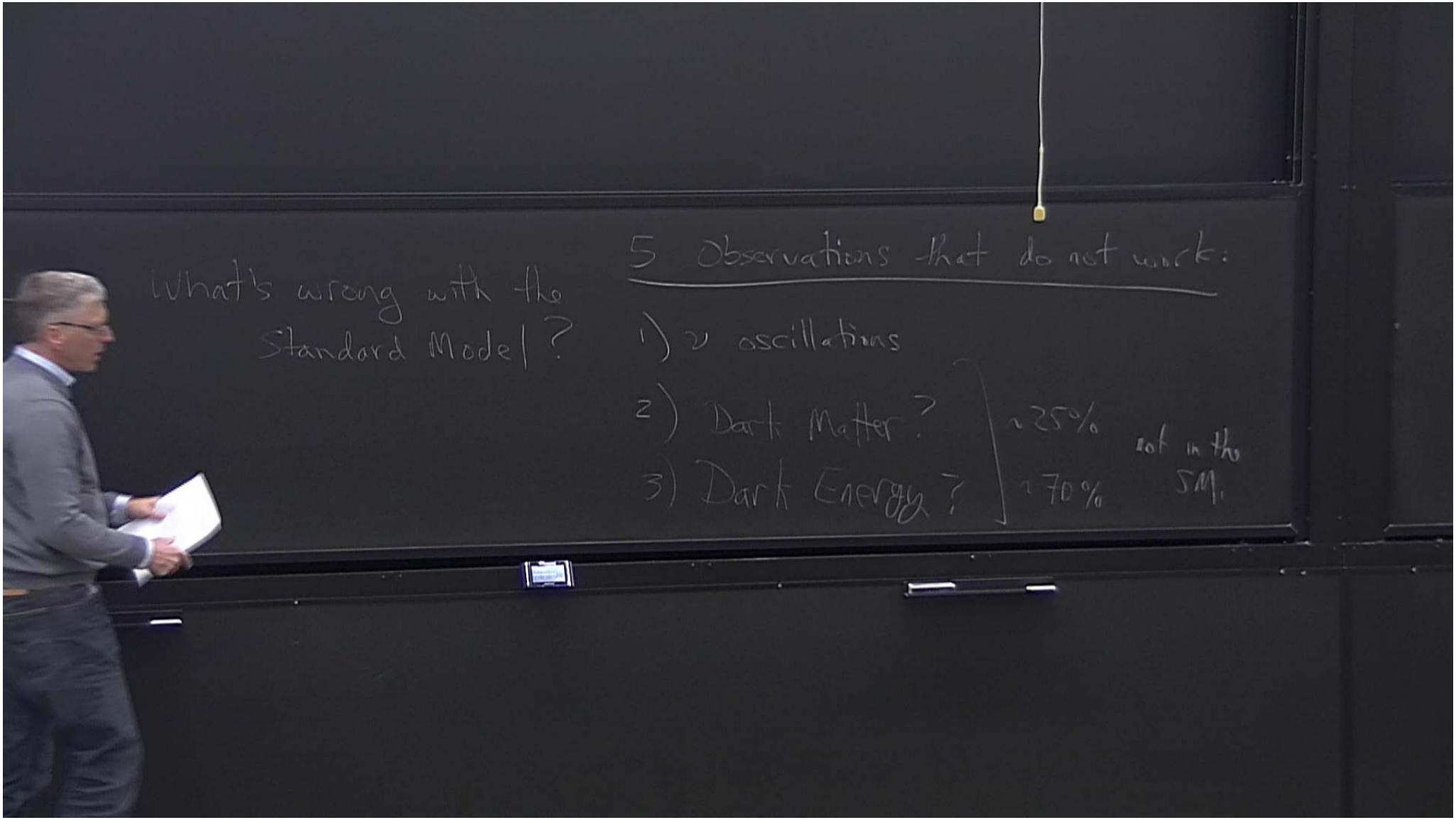
Title: PSI 2015/2016 Explorations in Particle Theory - Burgess - 1

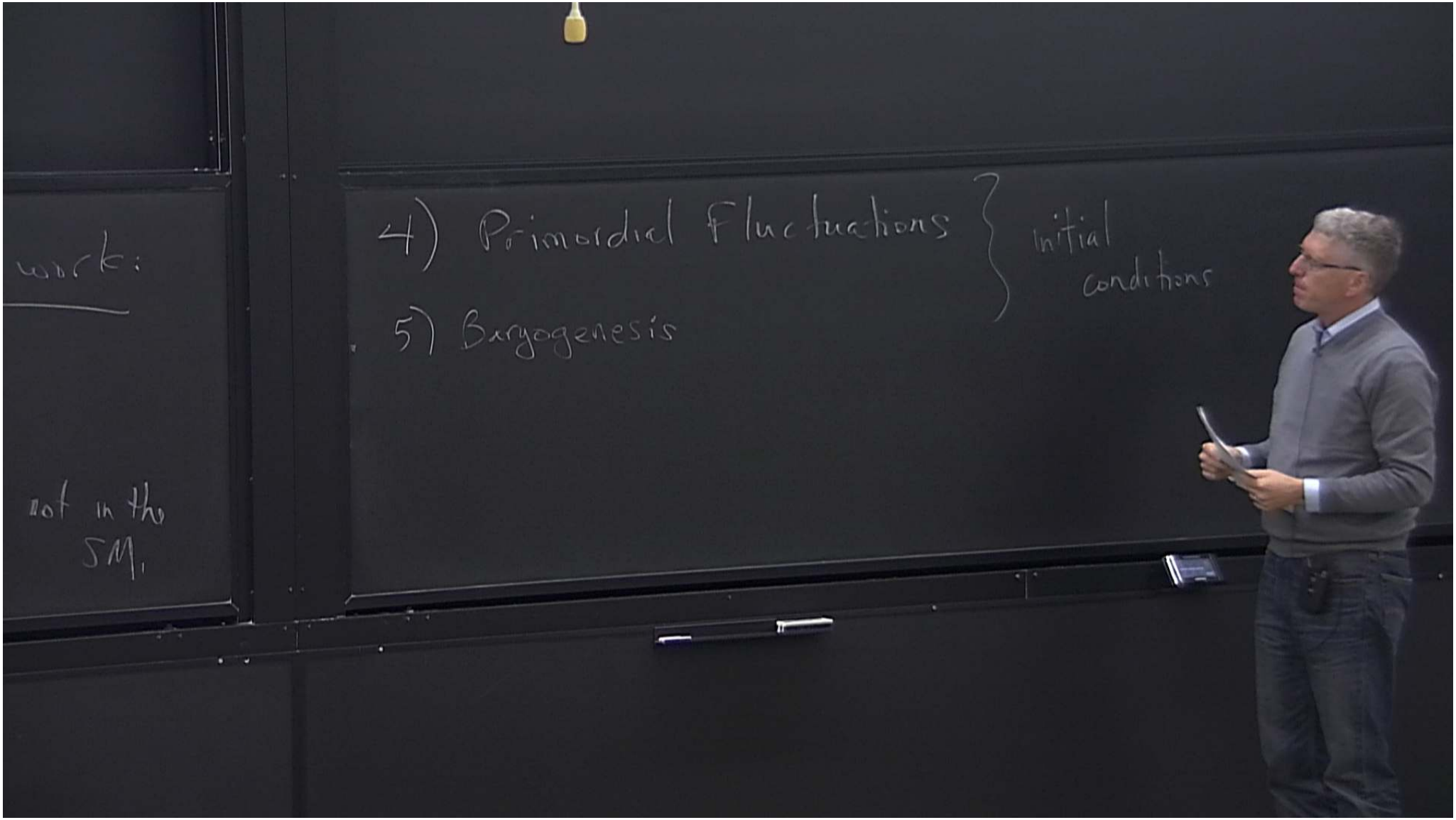
Date: Apr 11, 2016 09:00 AM

URL: http://pirsa.org/16040020

Abstract:

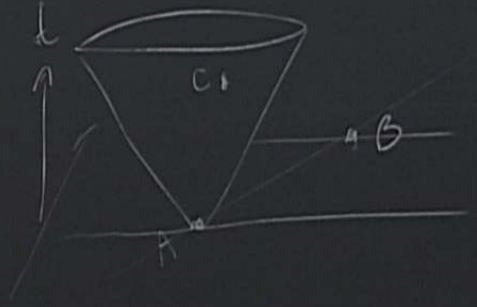

Overview
What's wrong with the
Standard Model?


What's wrong with the Standard Model?
5 Observations that do not work:
1) ν oscillations
2) Dark Matter? ≈25%
3) Dark Energy? ≈70%
not in the SM.

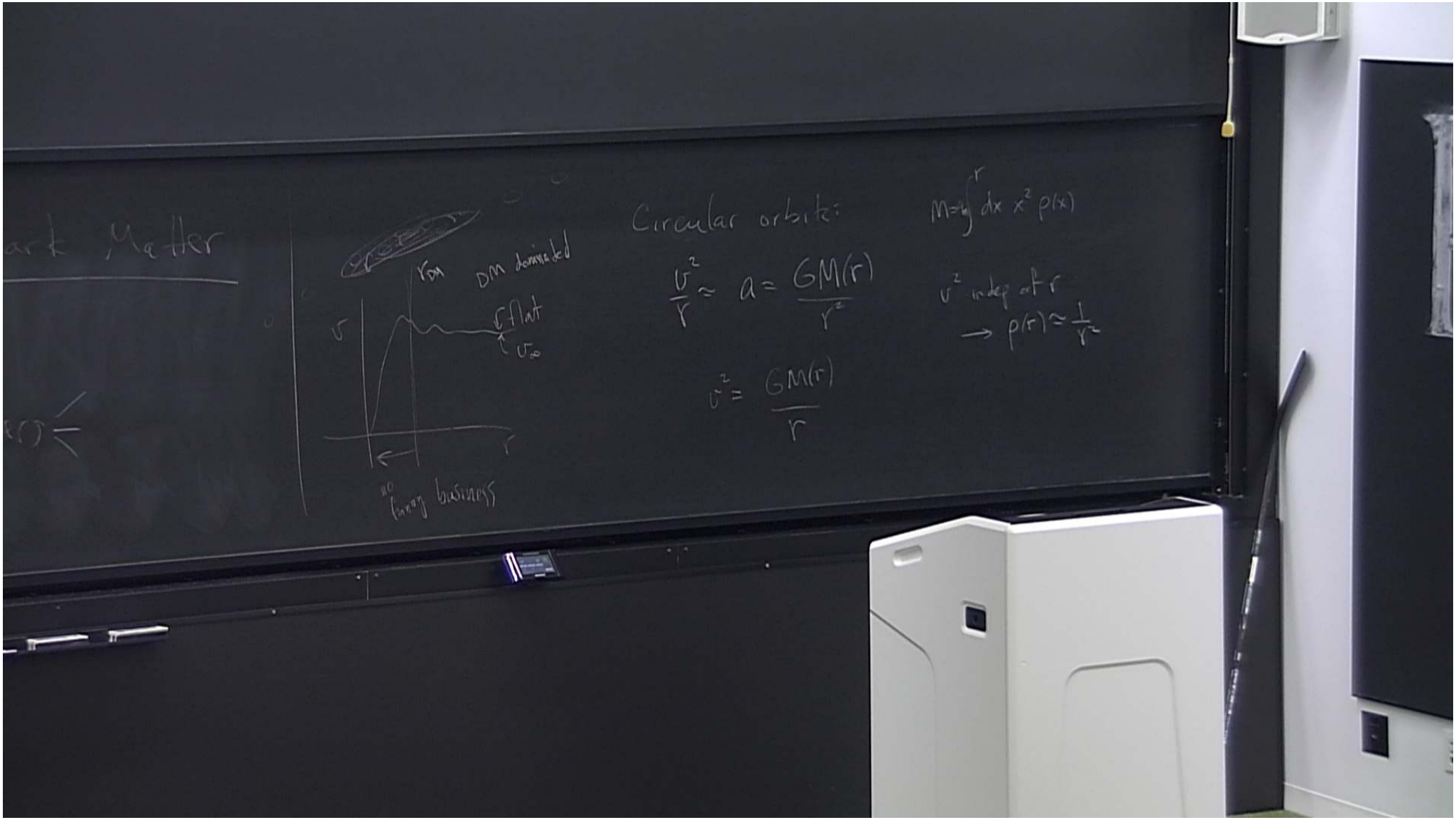

work:
not in the SM.
4) Primordial Fluctuations
5) Baryogenesis
initial conditions

Relativity of simultaneity:

Causality:



nothing moves faster than light

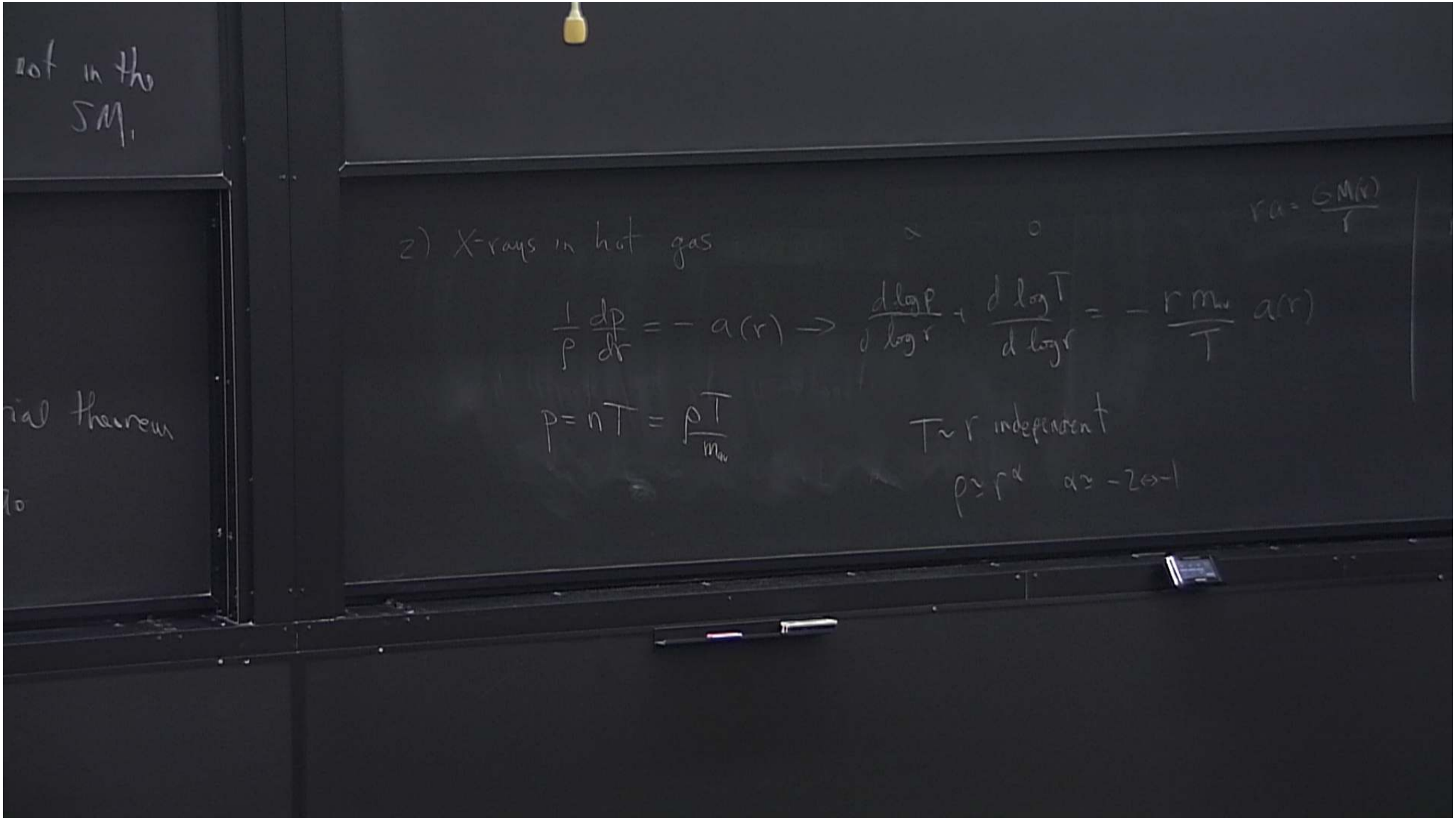

Matter
r_{DM}
DM dominated
flat
v_∞
v
r
no funny business
Circular orbits:
$\frac{v^2}{r} \approx a = \frac{GM(r)}{r^2}$
$v^2 = \frac{GM(r)}{r}$
$M = \int^r dx\, x^2 \rho(x)$
v^2 indep of r
$\rightarrow \rho(r) \approx \frac{1}{r^2}$

(Standard Model + GR) (2) Dark Matter? ~25% not in the SM.
(3) Dark Energy? ~70%

$v_\infty^4 \propto L$ Tully-Fisher relation

Plot $v(r/R_D)$ for many galaxies. then find r_{DM}/r_D depends only on L

For small L $r_{DM} \leq r_D$
For large L $r_{DM} \gtrsim r_D$
} can be summarized by r for which (MOND) $a(r) = v^2/r \simeq 10^{-10}\ cm/s^2 = a_0$


not in the SM.
ial theorem
lo
2) X-rays in hot gas
$r_a = \frac{GM(r)}{r}$
$\frac{1}{\rho}\frac{dp}{dr} = -a(r) \rightarrow \frac{d\log p}{d\log r} + \frac{d\log T}{d\log r} = -\frac{r m_{av}}{T} a(r)$
$p = nT = \frac{\rho T}{m_{av}}$
$T \sim r$ independent
$\rho \simeq r^{\alpha}$ $\alpha \simeq -2 \leftrightarrow -1$