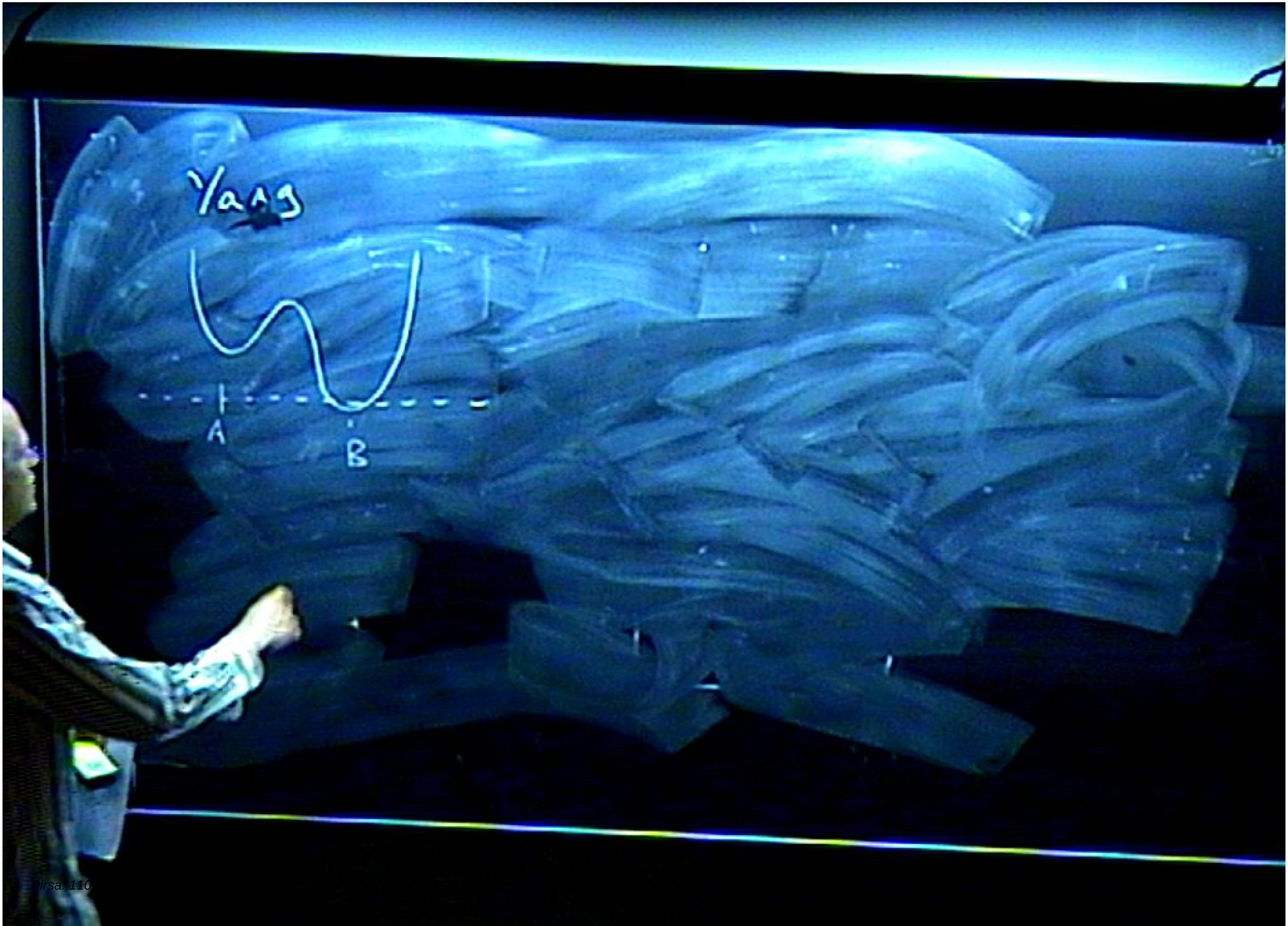
Title: Bringing Terminal Vacua Back to Life With Classical Transitions

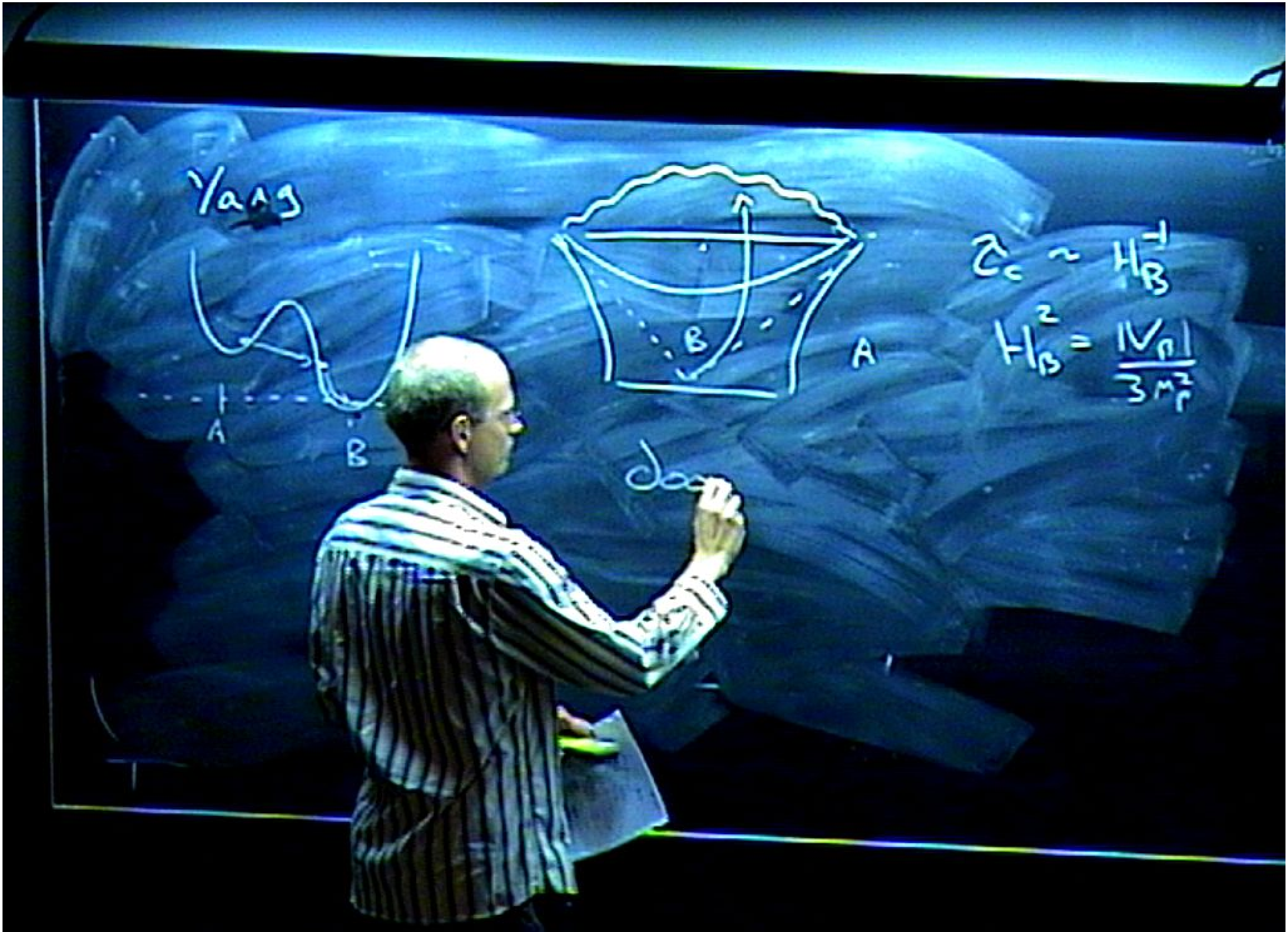
Date: Jul 12, 2011 05:30 PM

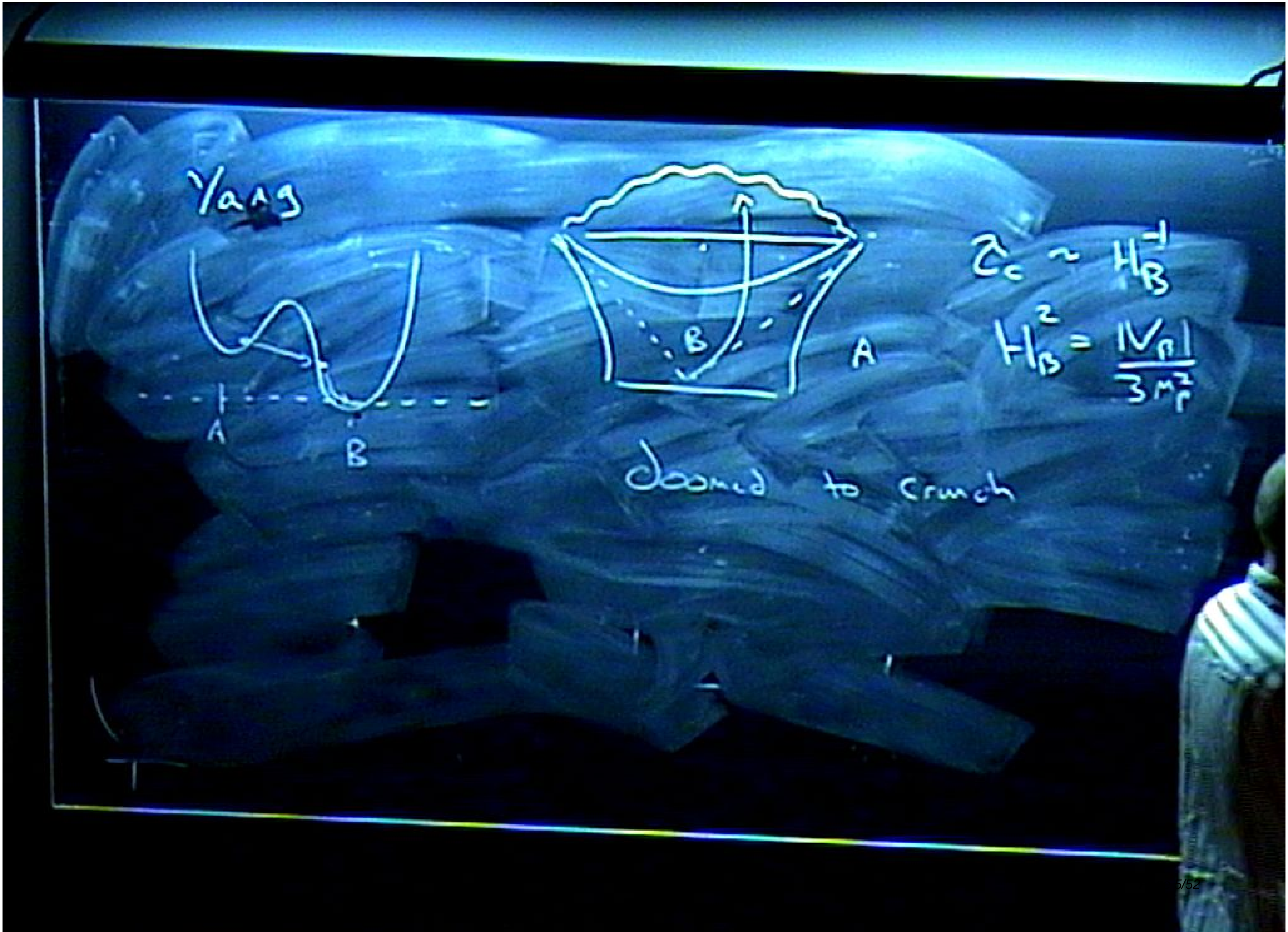
URL: http://pirsa.org/11070016

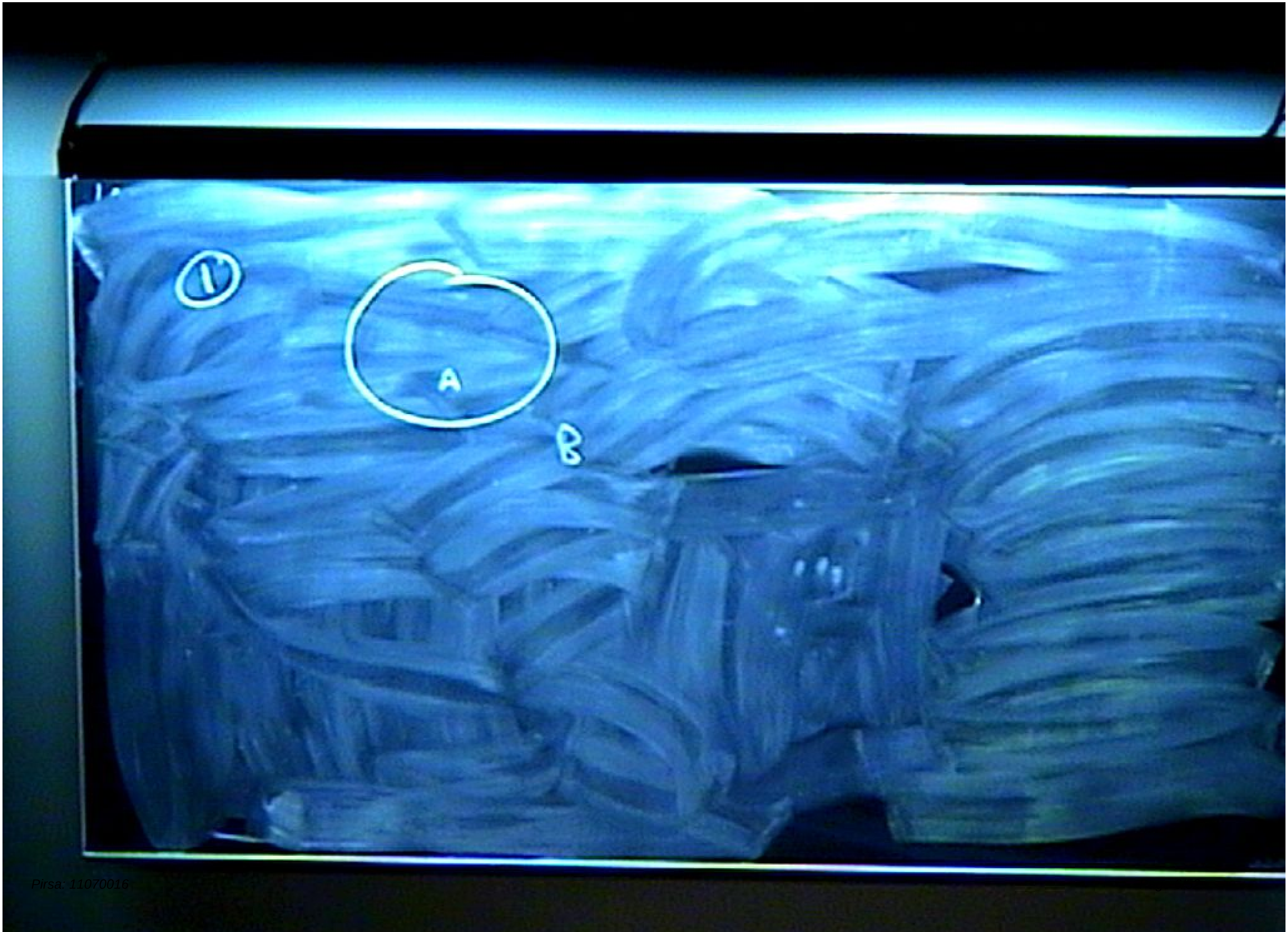
Abstract: In this talk, I will describe how the collision of Minkowski or crunching bubbles can re-start inflation in a portion of the bubble interior. Consistent with various singularity theorems, such collisions can only seed a lasting inflationary phase with energy density lower than that of the parent vacuum.

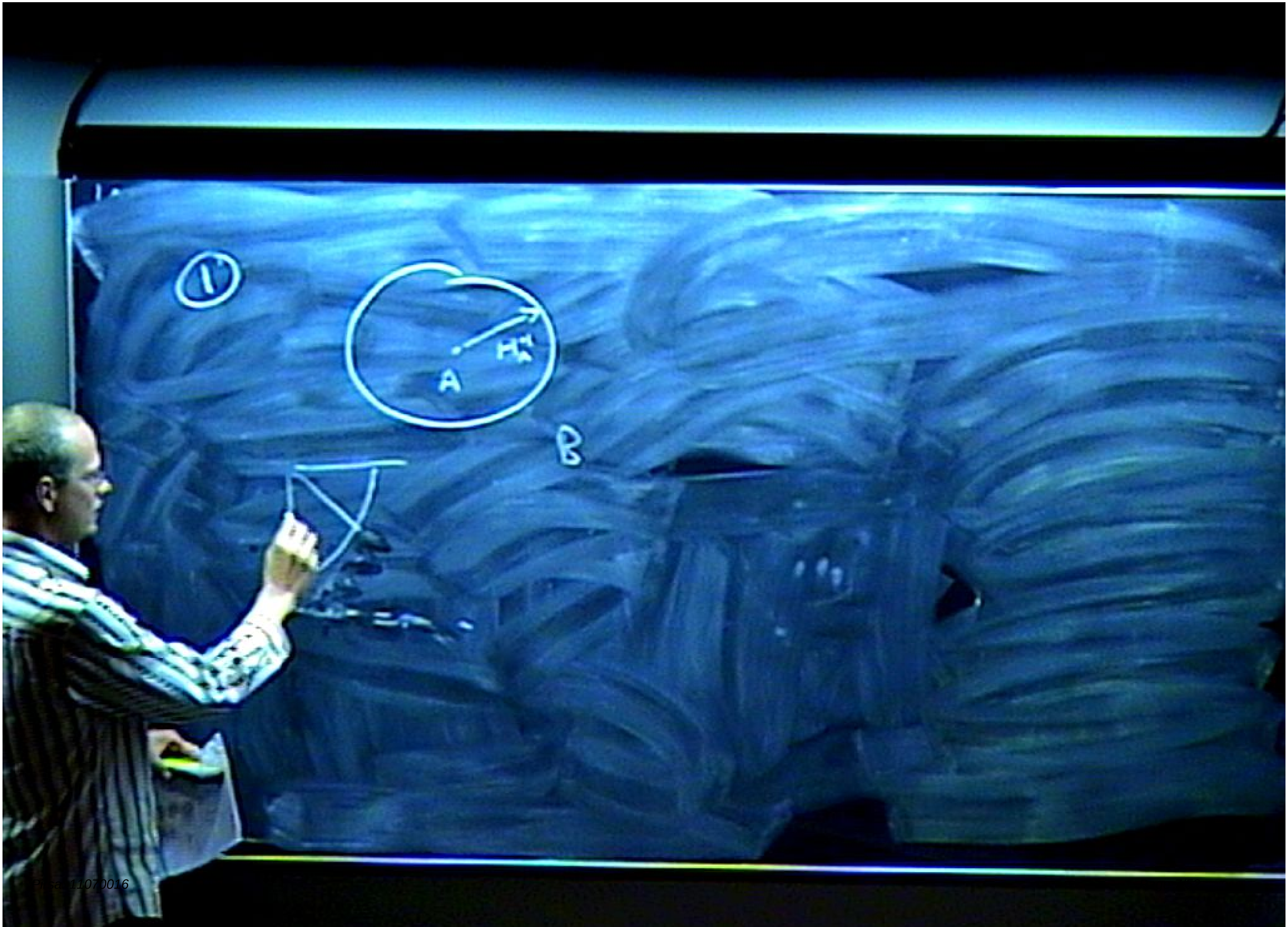

No Signal
VGA-1


Yang
A
B

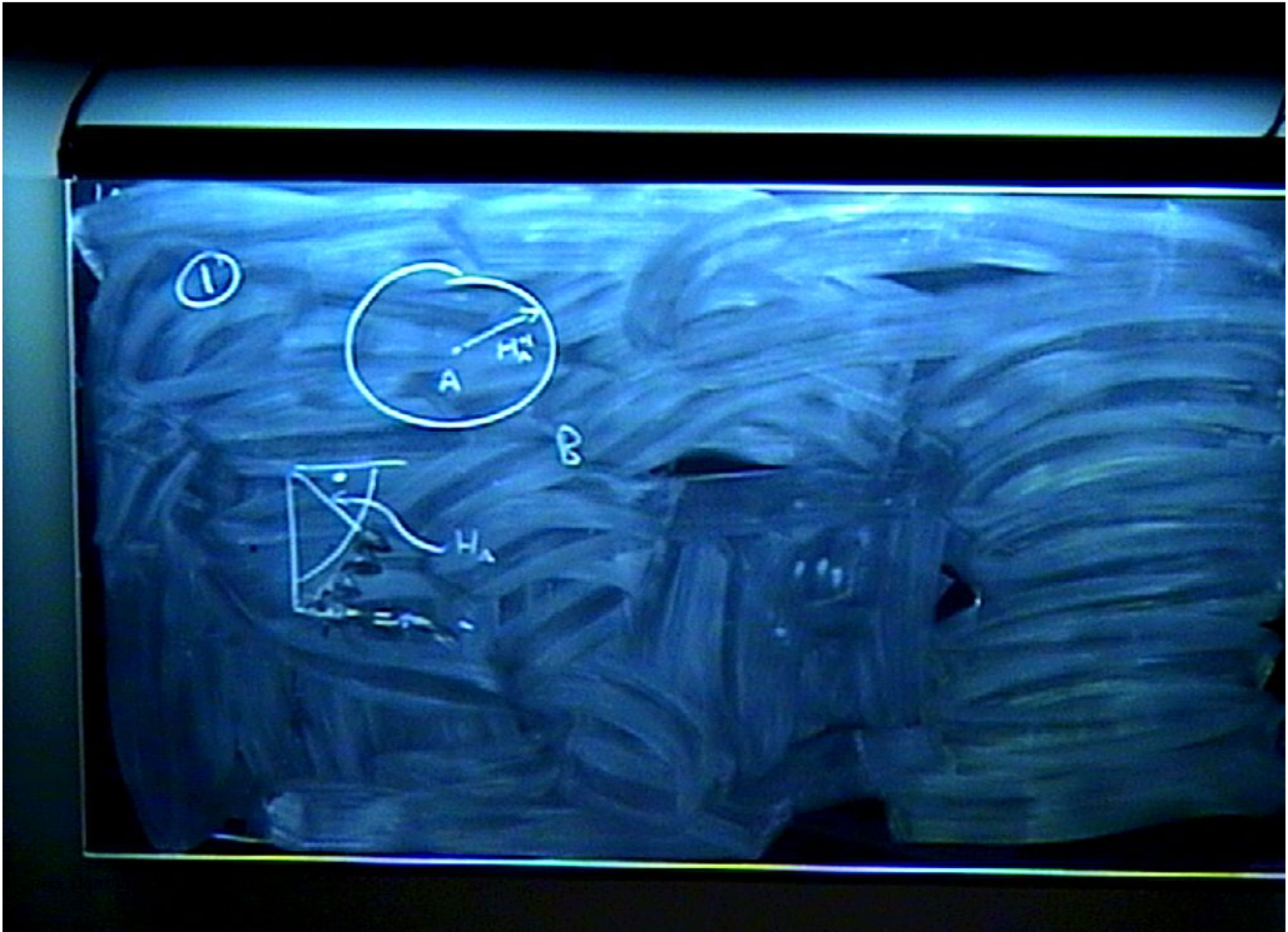

Yang
A
B
B
A
$\tau_c \sim H_B^{-1}$
$H_B^2 = \frac{|V_n|}{3m_r^2}$

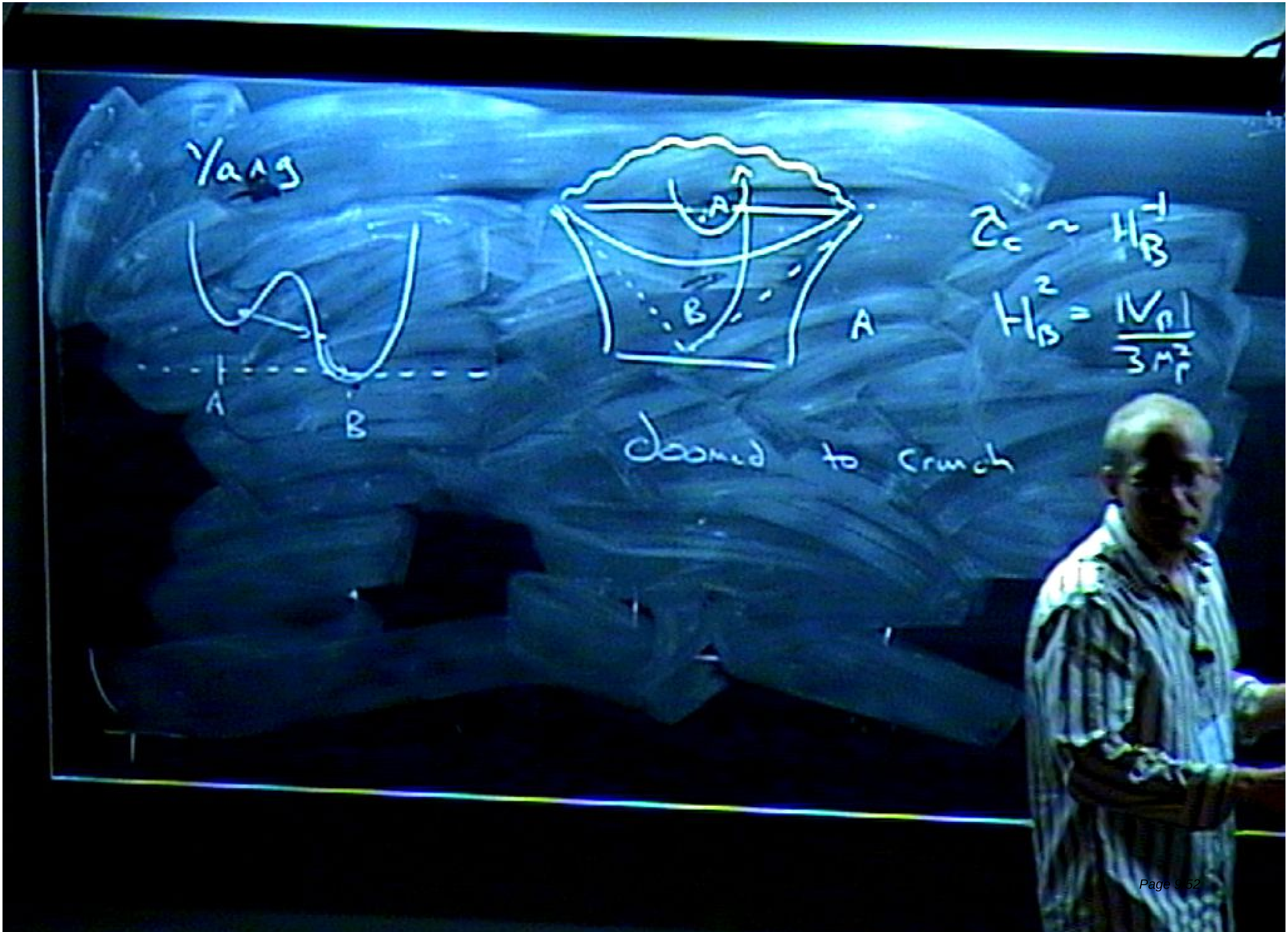

Yang
A
B
B
A
$\tau_c \sim H_B^{-1}$
$H_B^2 = \frac{|V_B|}{3M_P^2}$
doomed to crunch

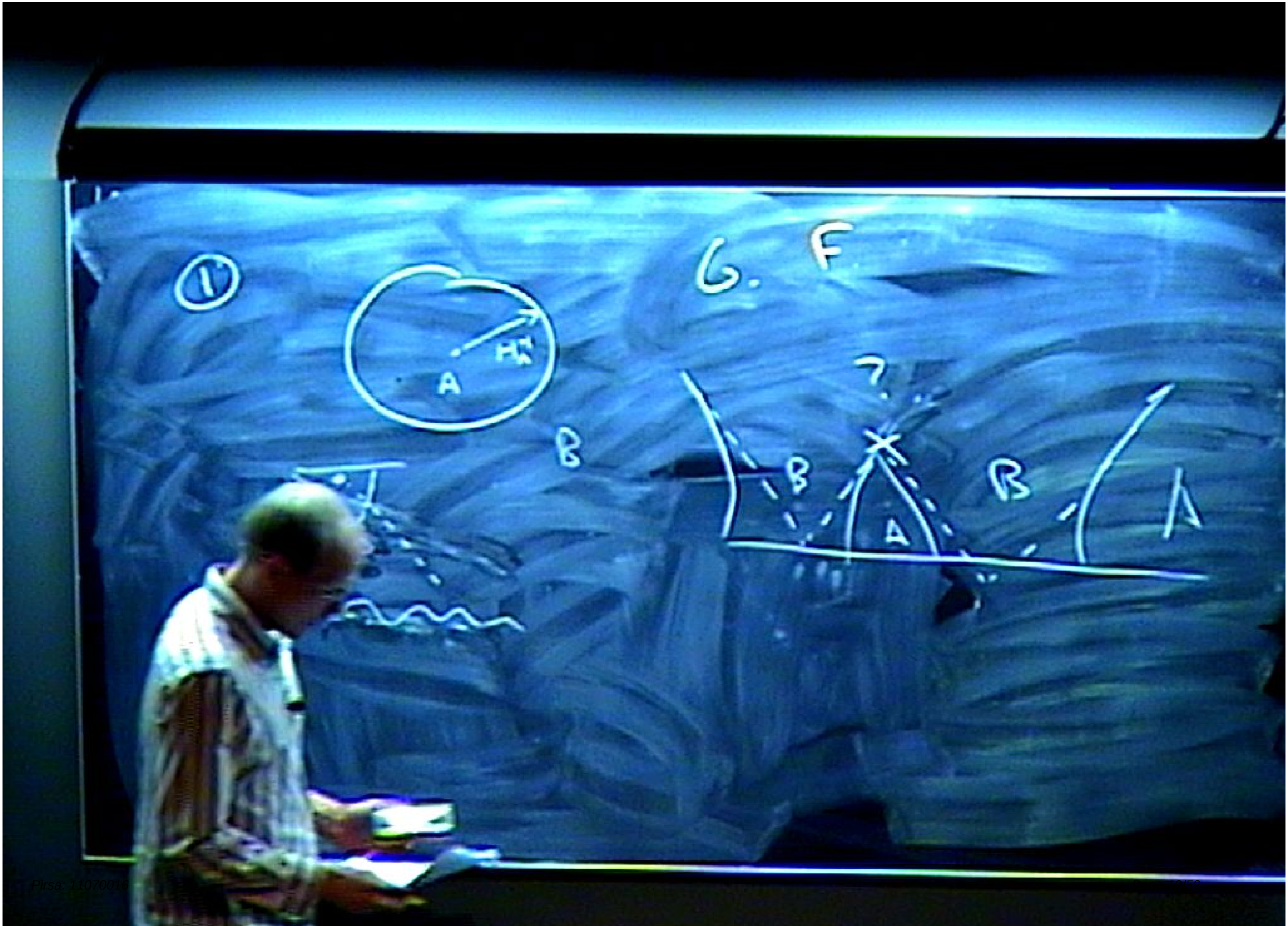

A
B

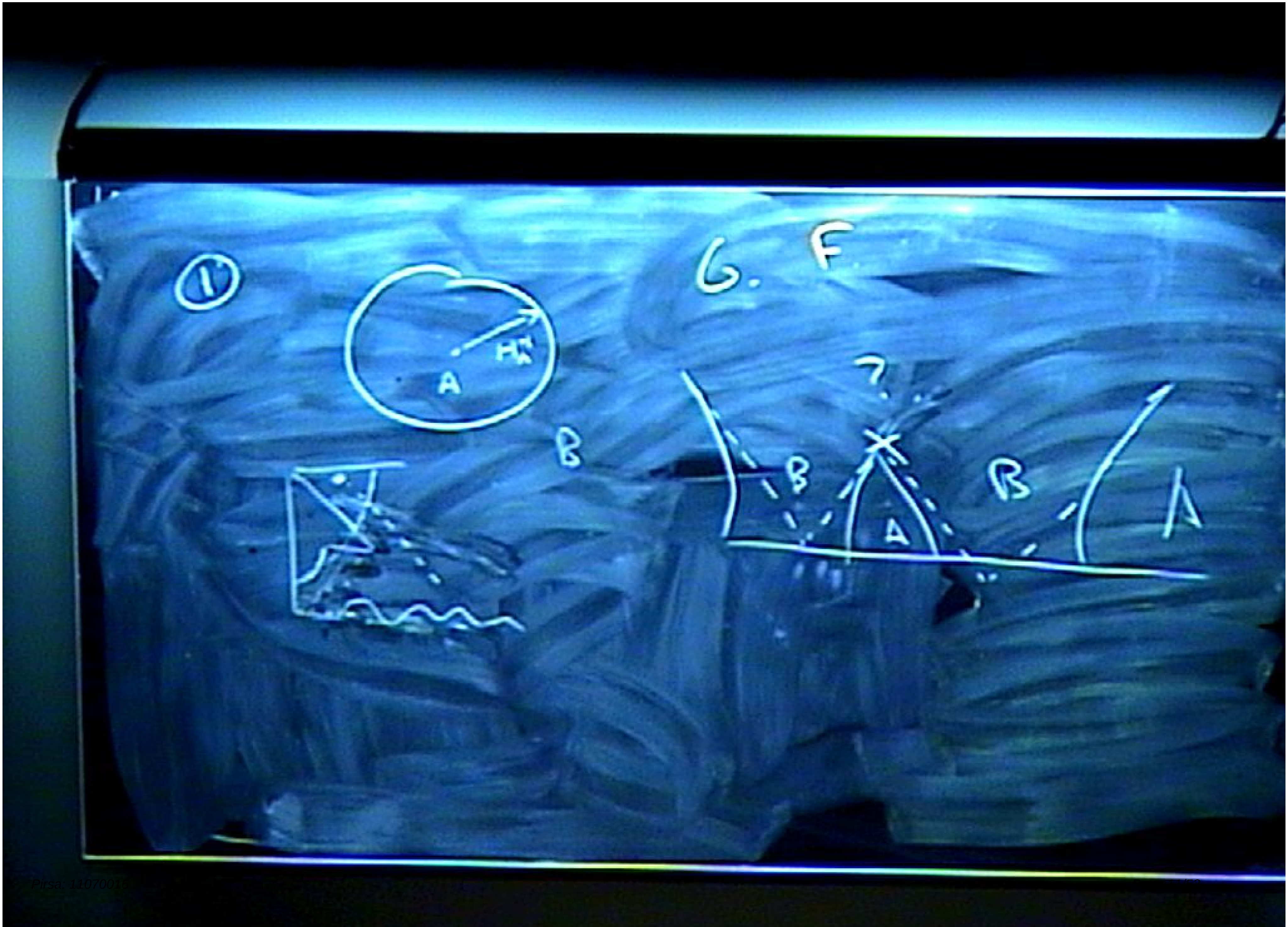


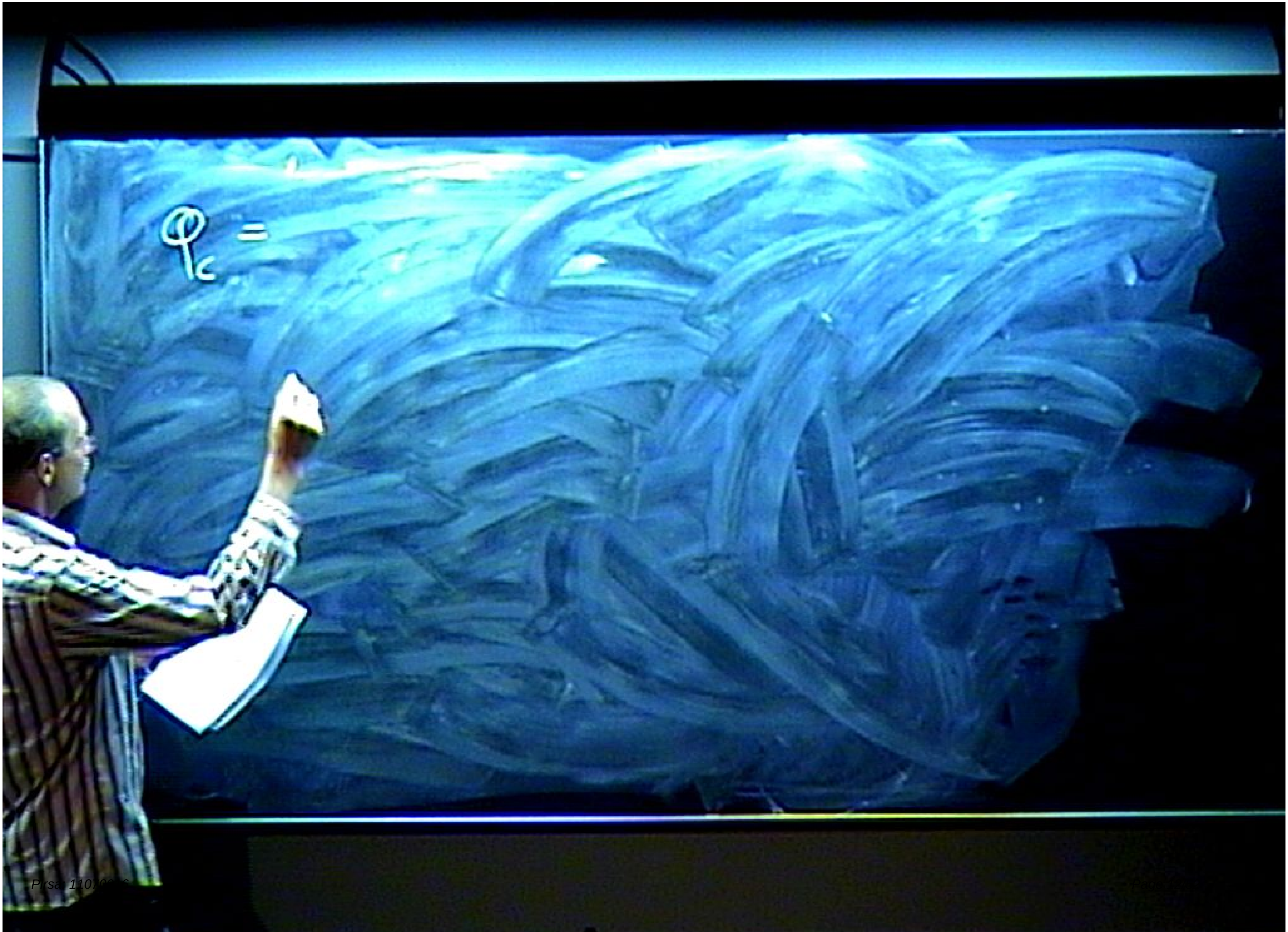
Pisa: 11070016

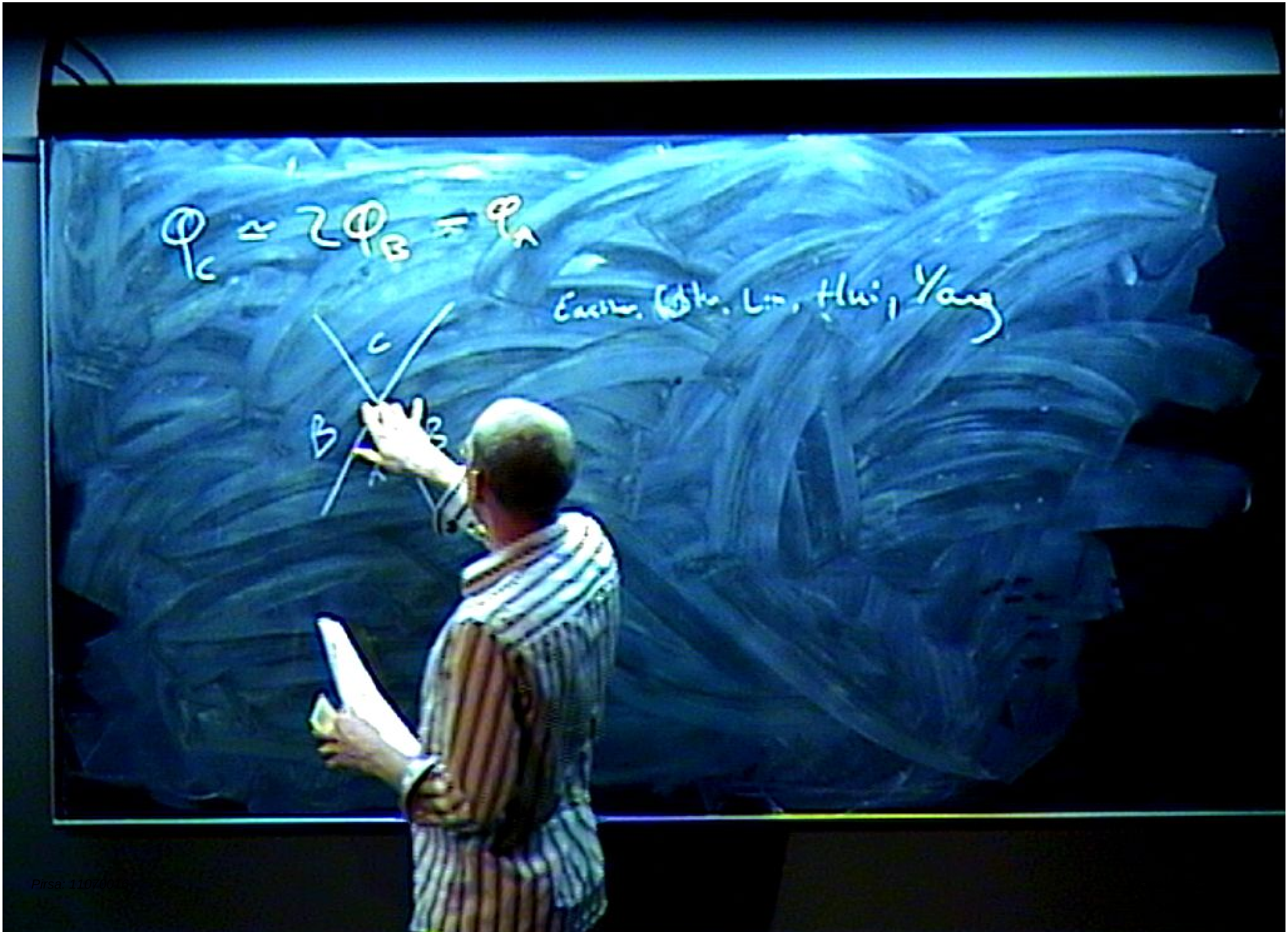

1
A
B


Yang
A
B
A
B
A
$\tau_c \sim H_B^{-1}$
$H_B^2 = \frac{|V_B|}{3M_P^2}$
doomed to crunch


1
A
B
G. F
B
A
B
A


1
A
B
G. F.
B
A
B
A

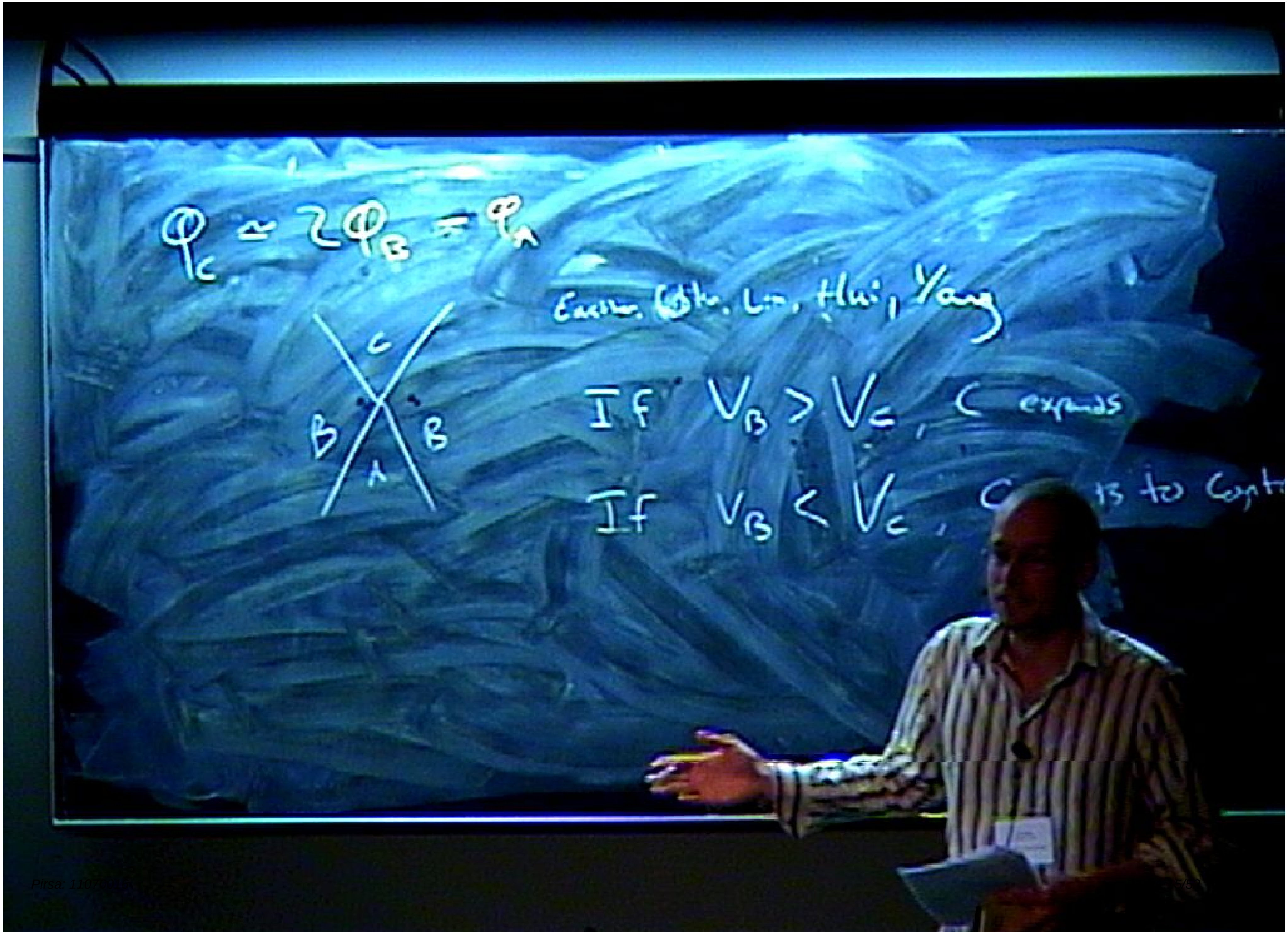

$\varphi_c =$

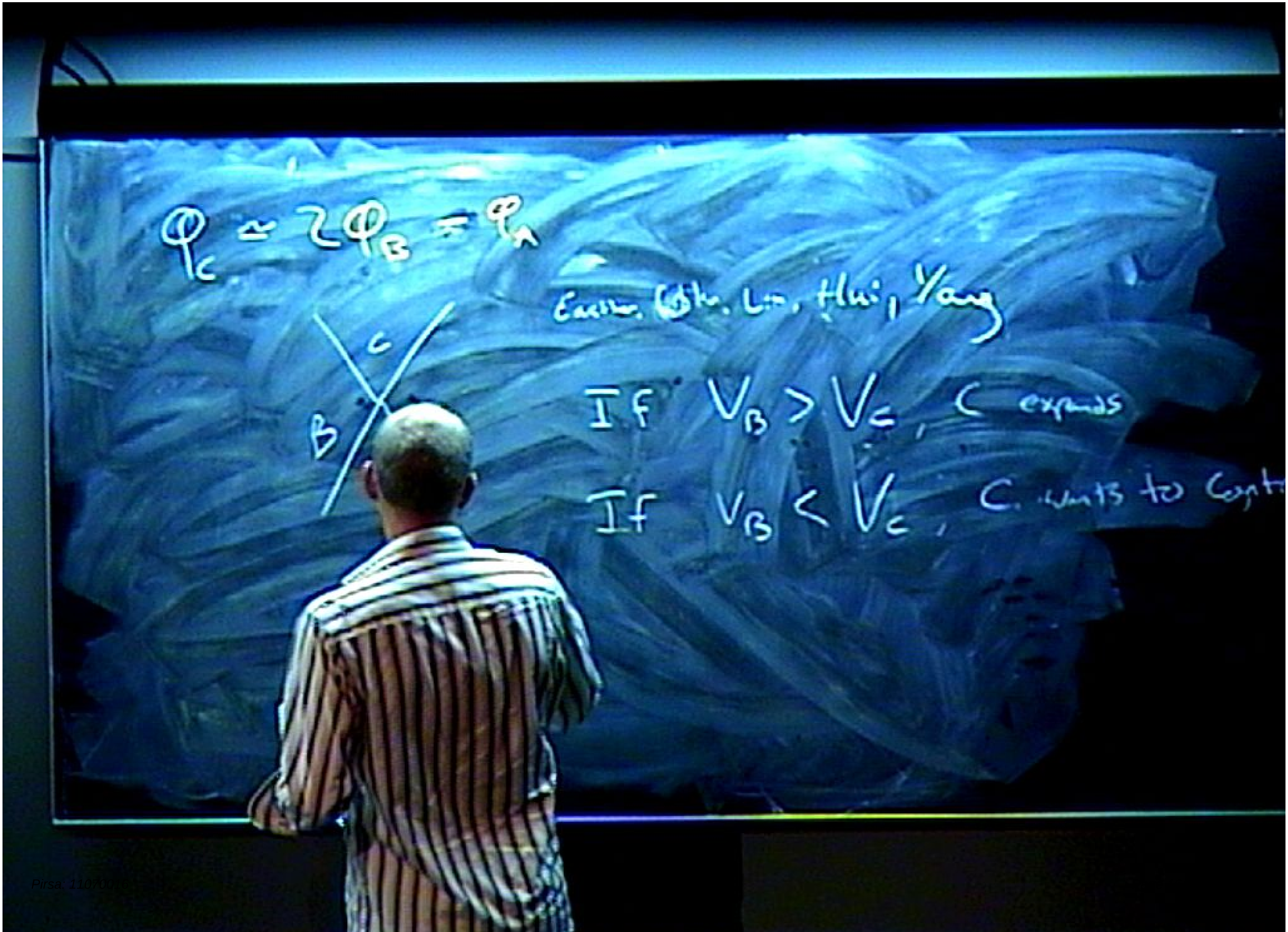


$\varphi_C \simeq 2\varphi_B = \varphi_A$
Lin, Hui, Yang
C
B
B

$$\varphi_C \simeq 2\varphi_B = \varphi_A$$

Easther, Giblin, Lim, Hui, Yang


$\varphi_C \simeq 2\varphi_B = \varphi_A$
C
B
B
A
If $V_B > V_C$, C expands
If $V_B < V_C$,


φC ≃ 2φB = φA
C
B
If VB > VC , C expands
If VB < VC , C wants to contr

$\varphi_C \simeq 2\varphi_B = \varphi_A$

Easther, Giblin, Lim, Hui, Yang

If $V_B > V_C$, C expands

If $V_B < V_C$, C wants to contr

W/ Gravity

(1) Domain Walls are repulsive (VIS)

$\varphi_C \simeq 2\varphi_B = \varphi_A$

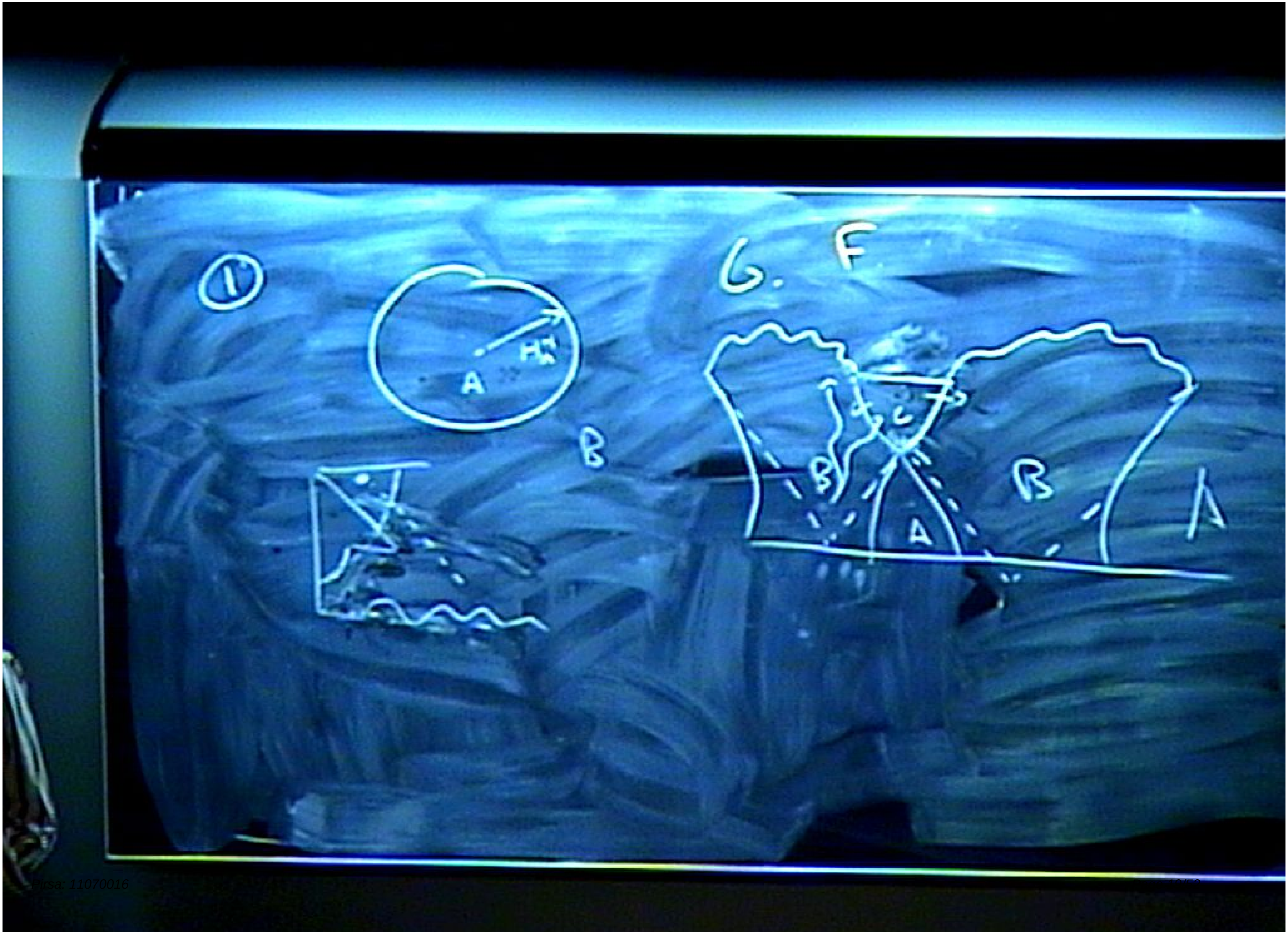
Easther, Giblin, Lim, Hui, Yang

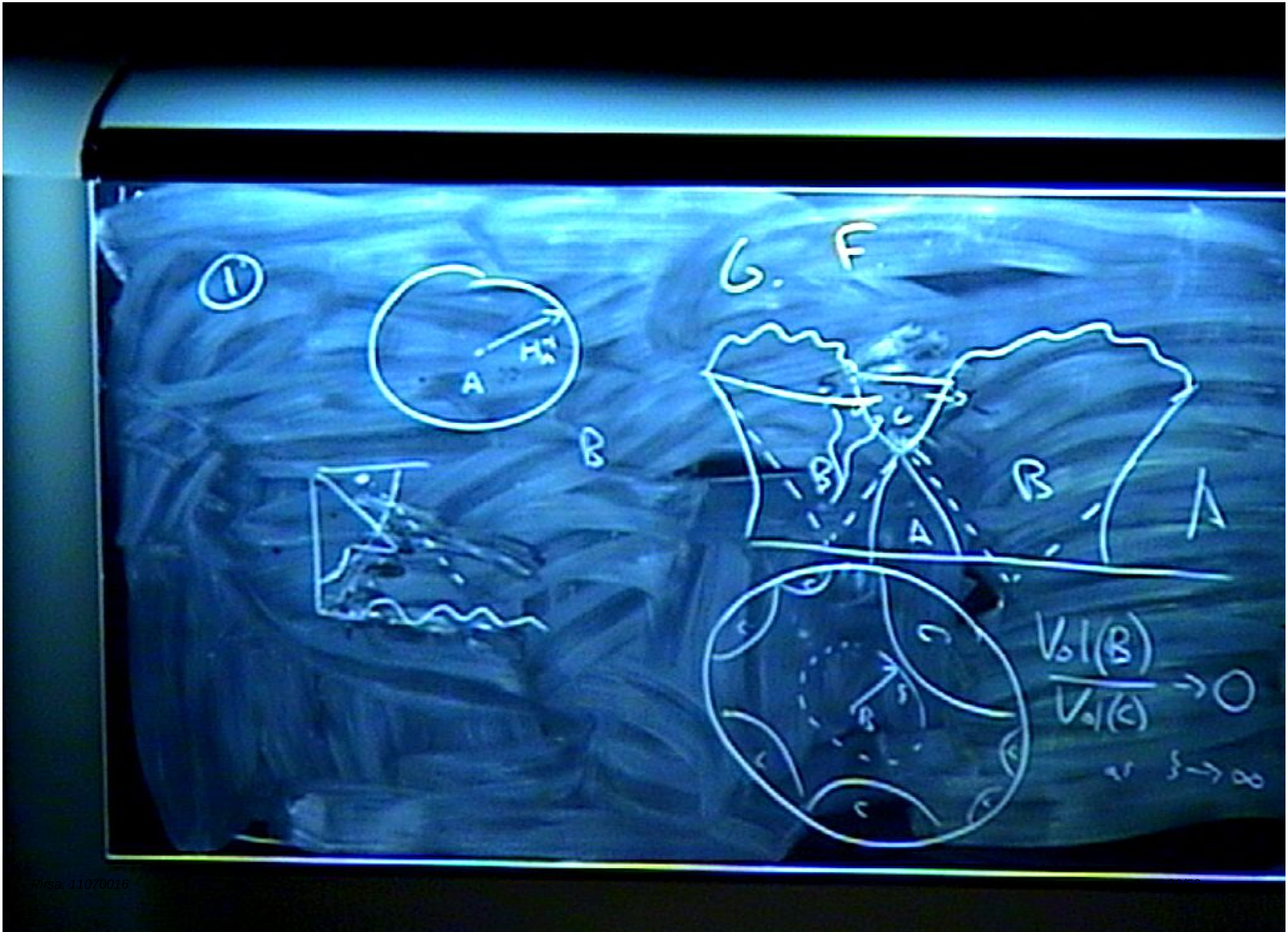
If $V_B > V_C$, C expands

If $V_B < V_C$, C wants to contr

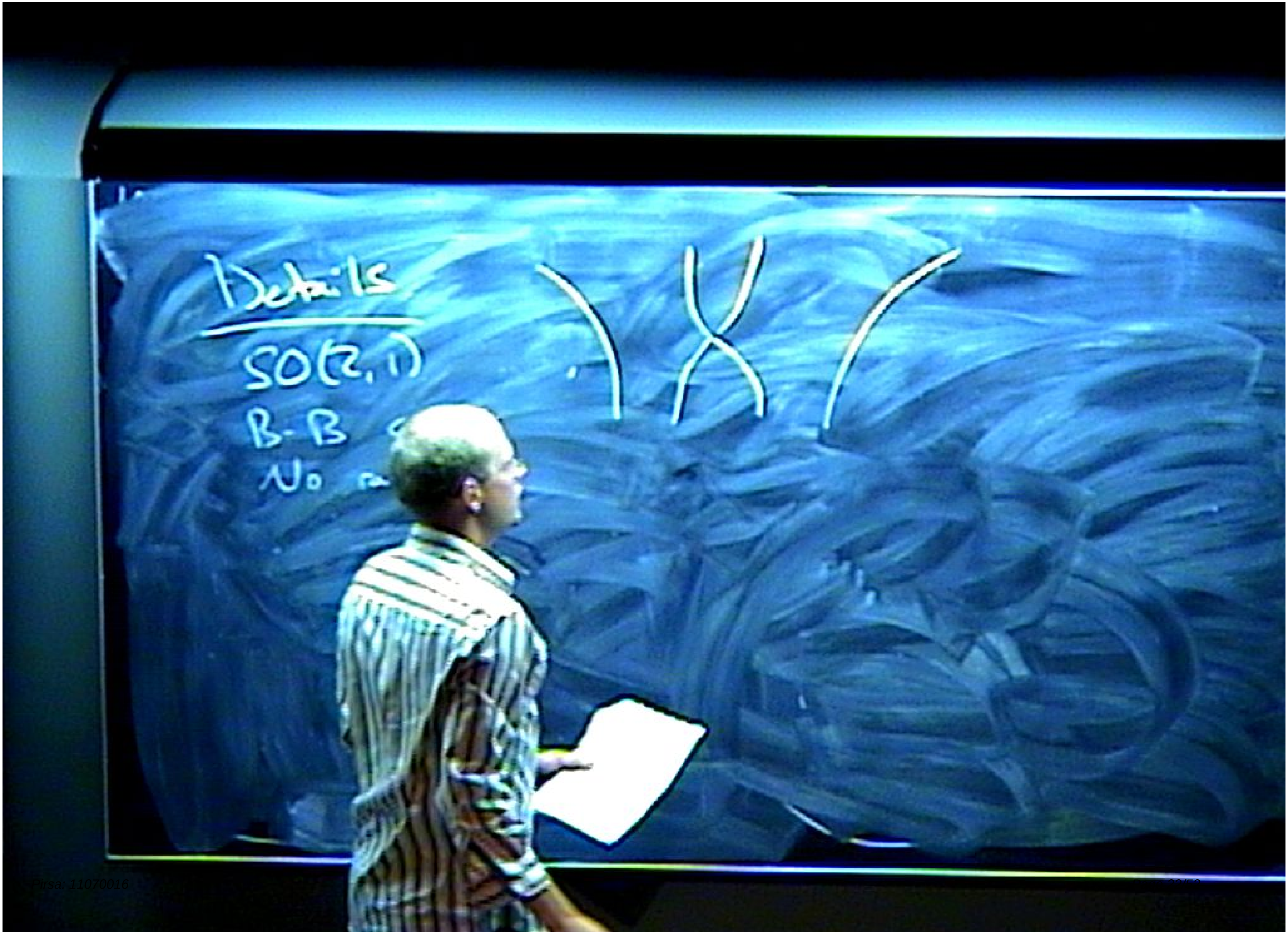
W/ Gravity

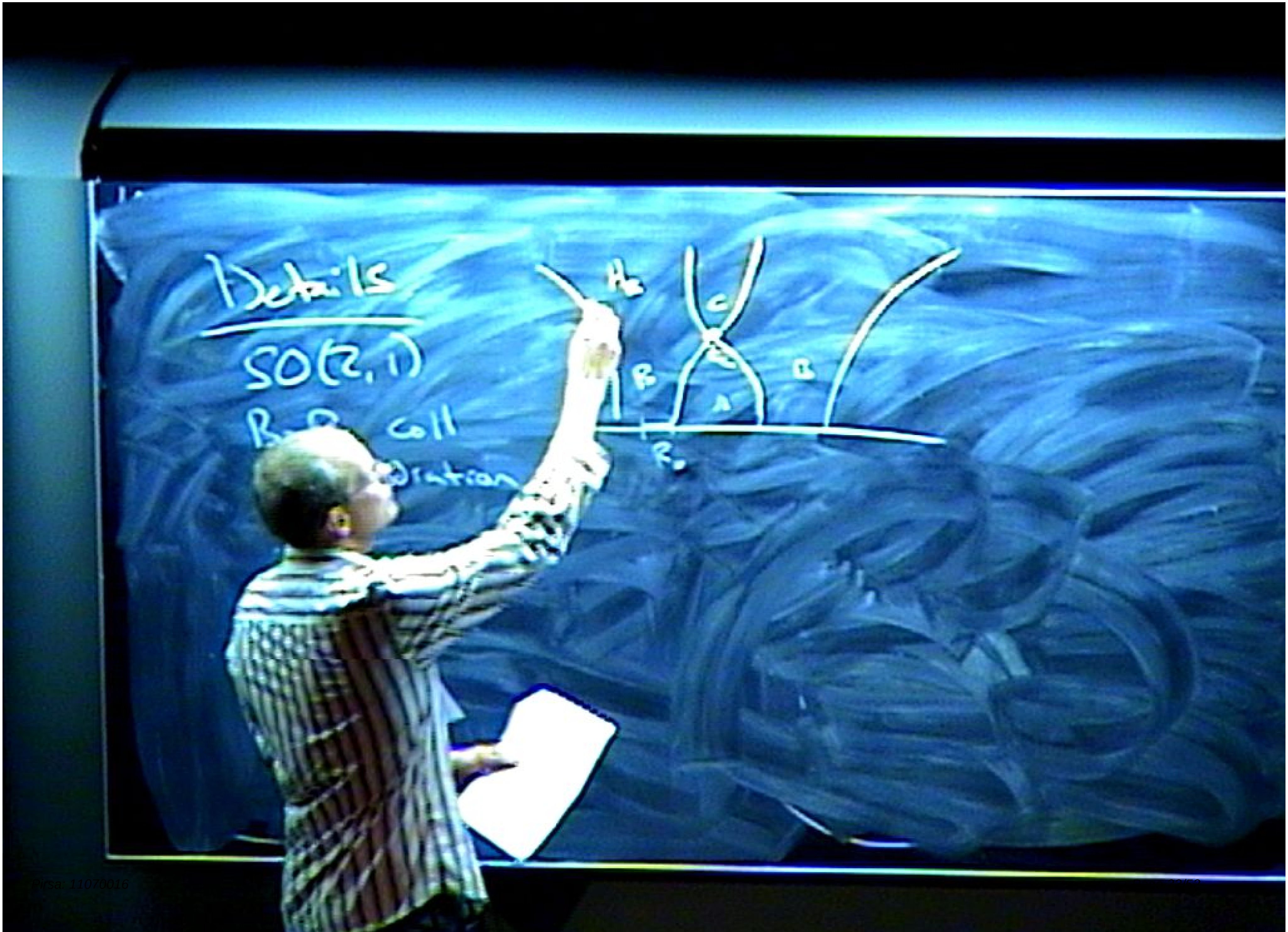
1. Domain Walls are repulsive (VIS)
2. too big to fail

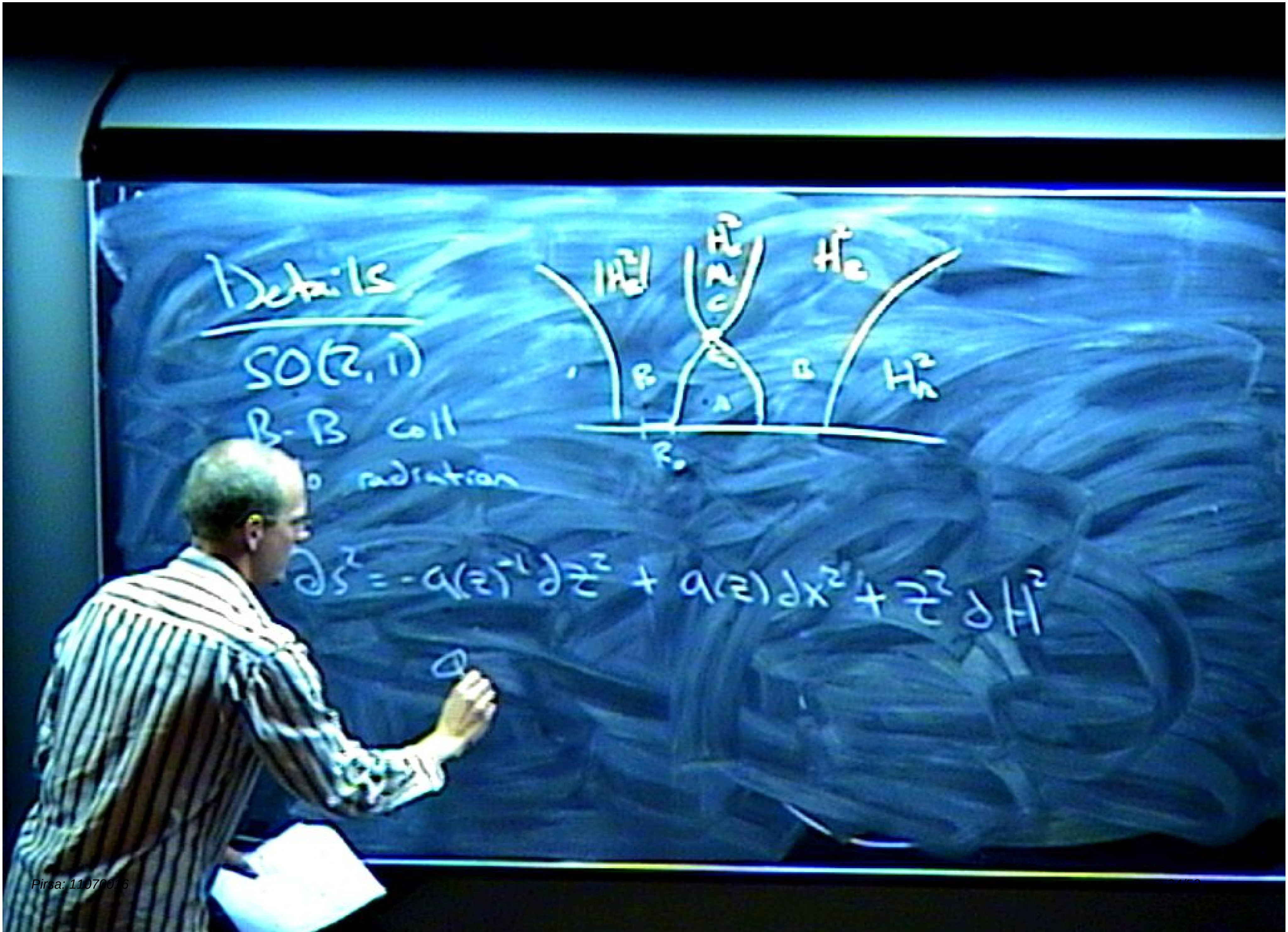

1
A
B
G. F.
B
A
B
A

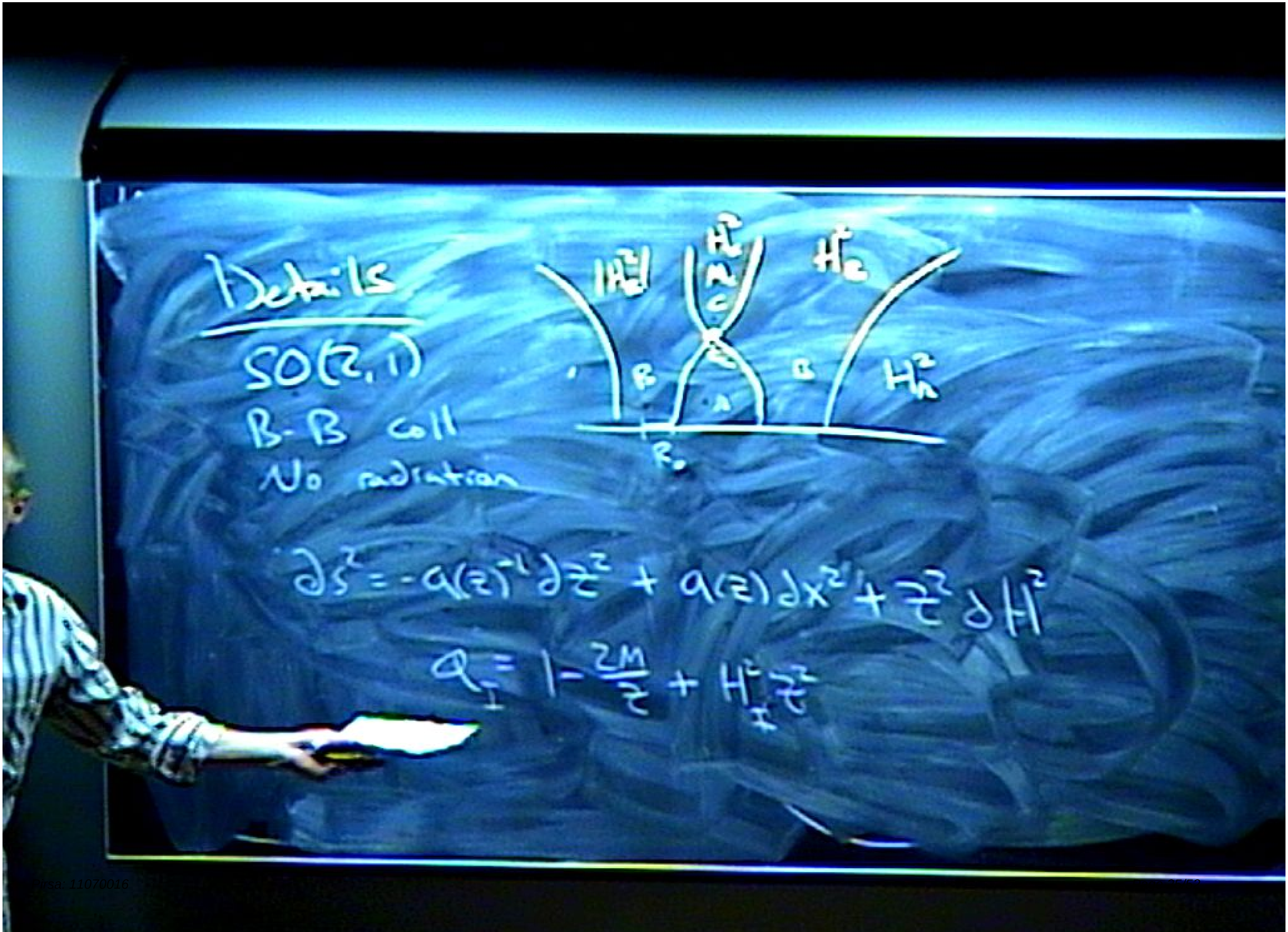

1
A
B
G. F.
B
A
C
Vol(B) / Vol(C) → 0
as s → ∞


Details


Details
SO(2,1)
B-B
No


Details
SO(2,1)


Details
SO(2,1)
B-B coll
radiation


Details
SO(2,1)
B-B coll
No radiation
H_c^2
H_2
H_h^2
R_0
$ds^2 = -a(z)^{-1}dz^2 + a(z)dx^2 + z^2 dH^2$
$a_I = 1 - \frac{2M}{z} + H_I^2 z^2$

Details

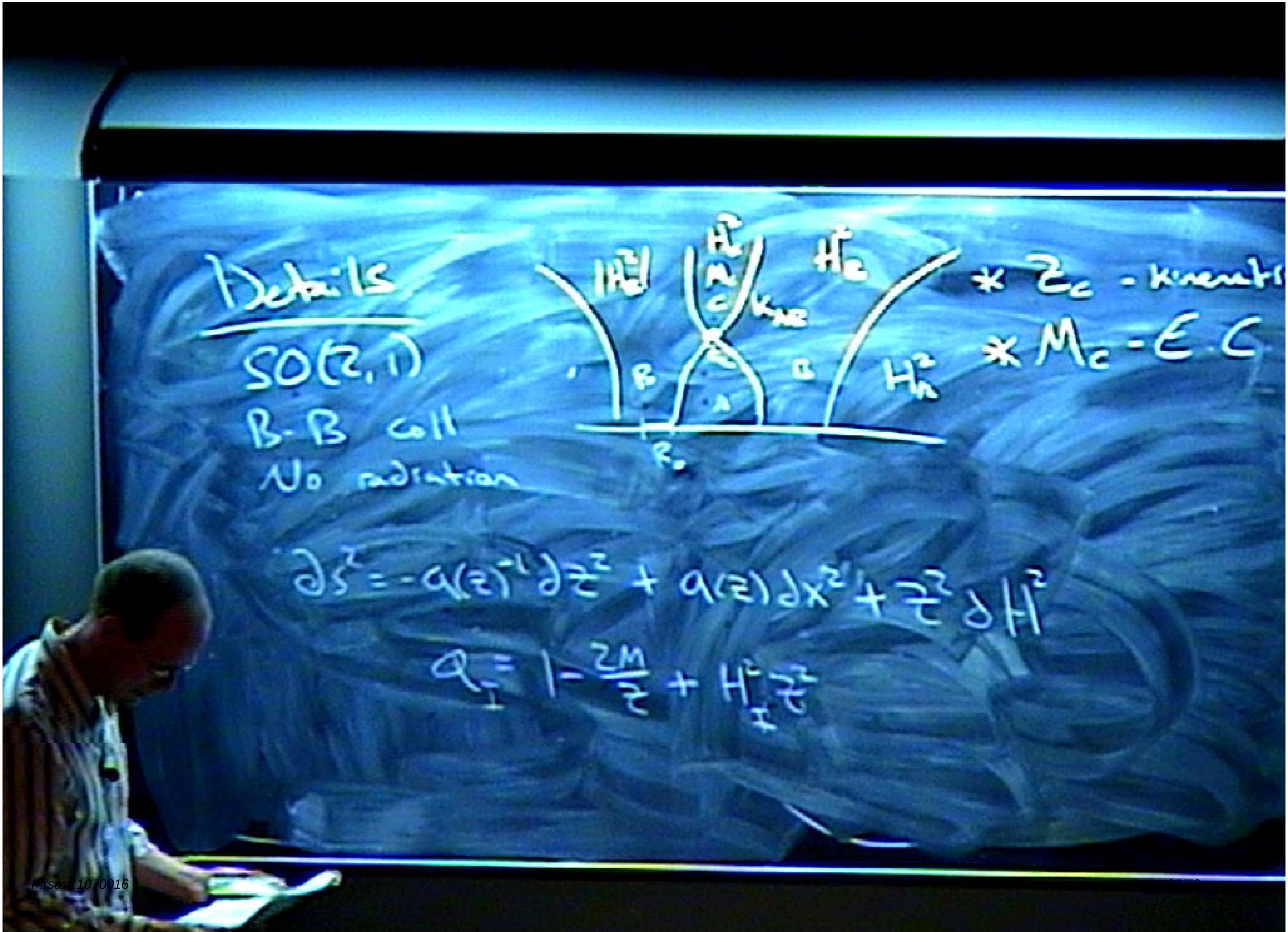
SO(2,1)

B-B coll

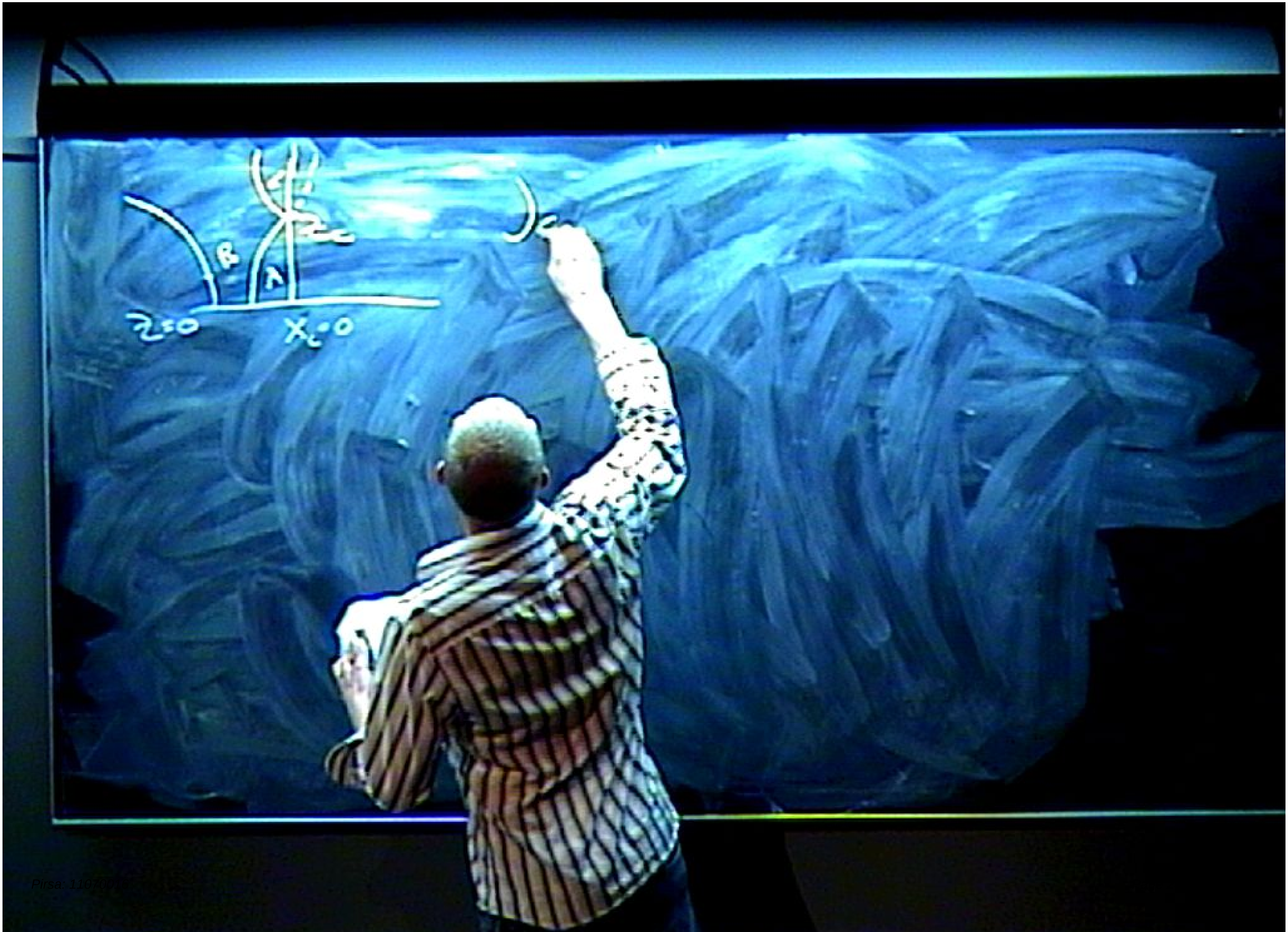
No radiation

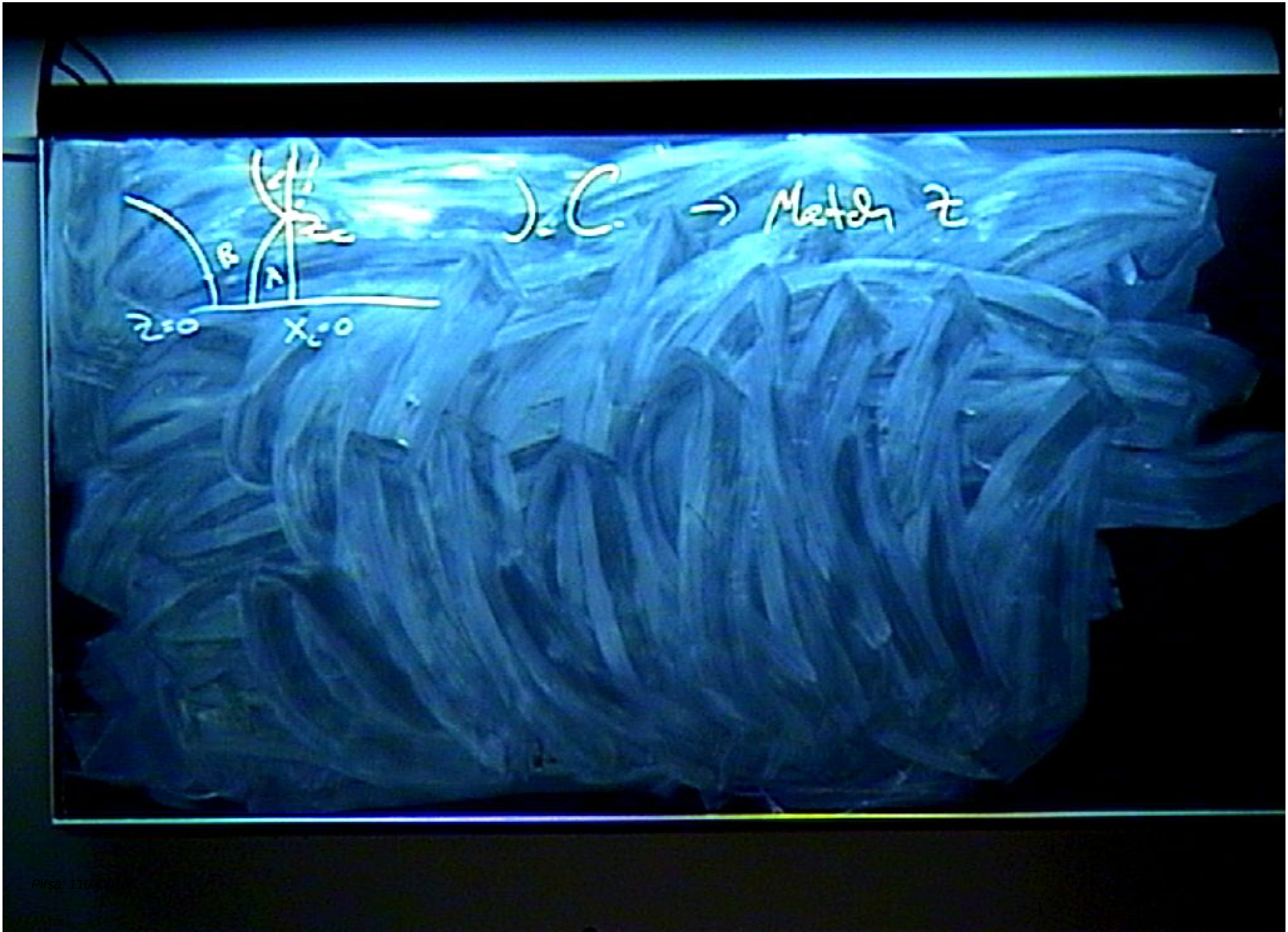
$$ds^2 = -a(z)^{-1} dz^2 + a(z)\, dx^2 + z^2\, dH^2$$

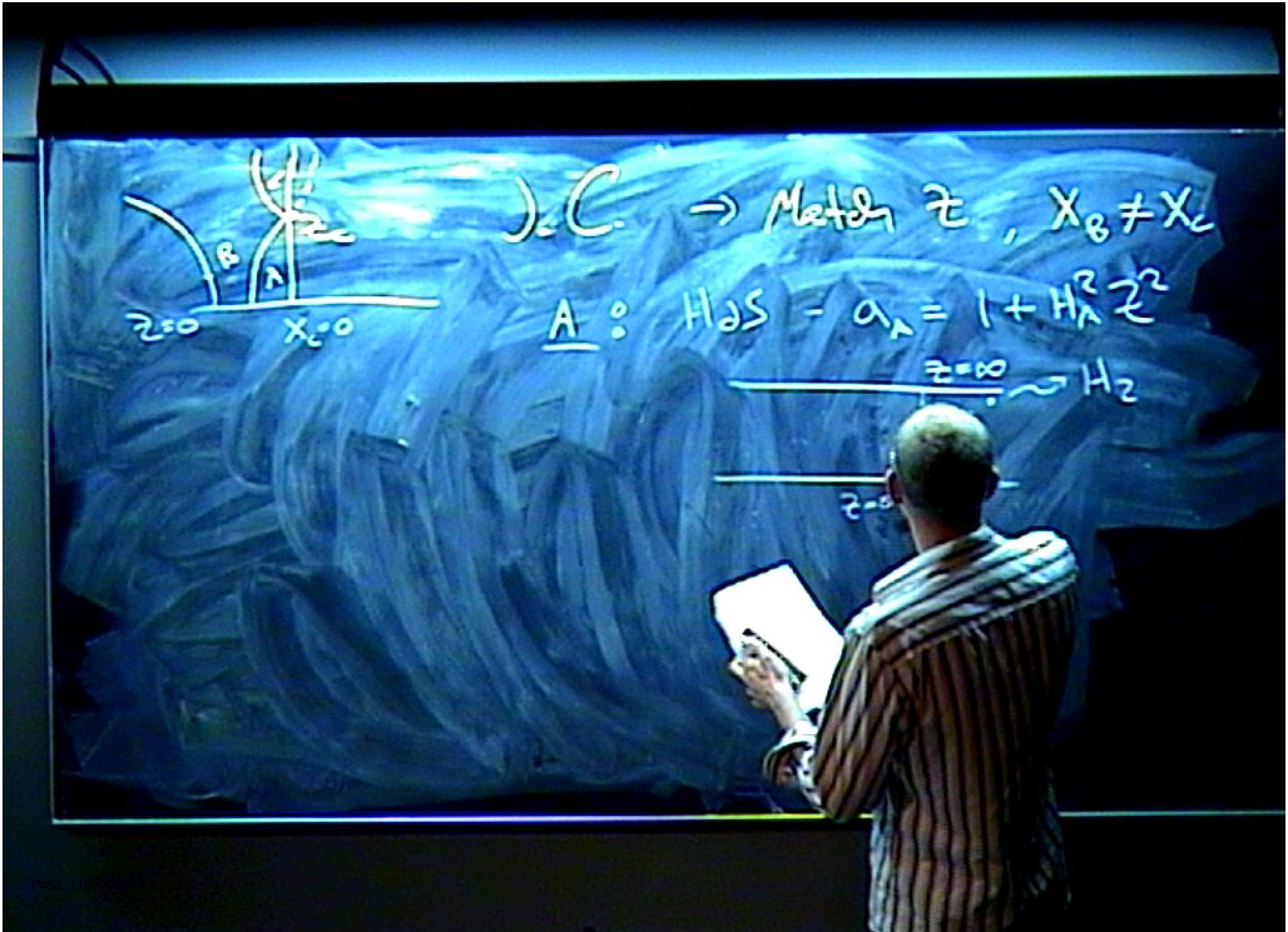
$$a_I = 1 - \frac{2M}{z} + H_I^2 z^2$$



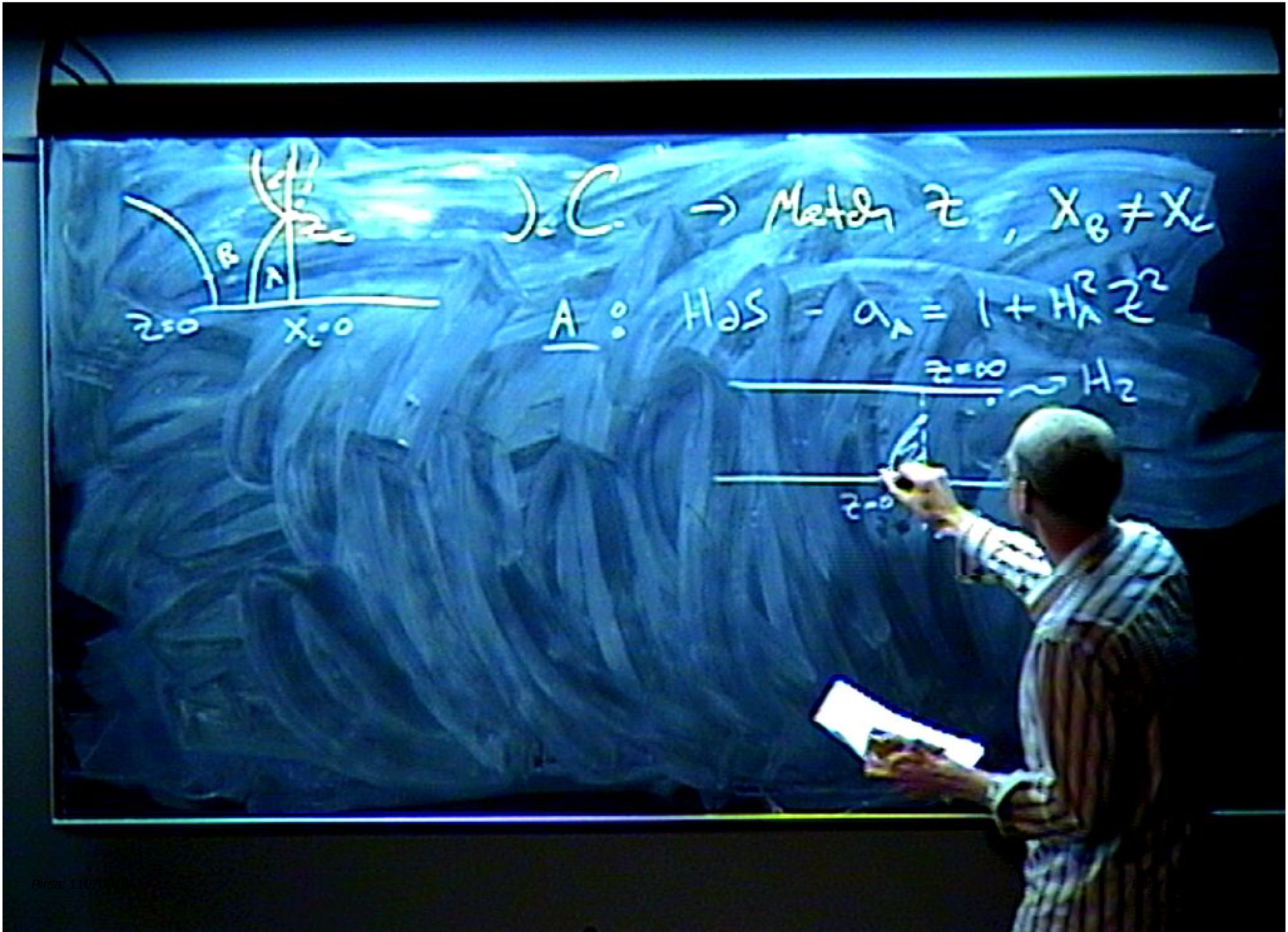
Details
SO(2,1)
B-B coll
No radiation
$\mathbb{H}^2_?$
H^2_c
H^2_n
K_{NB}
R_0
* z_c - kinemati
* M_c - E.C
$ds^2 = -a(z)^{-1} dz^2 + a(z) dx^2 + z^2 dH^2$
$a_I = 1 - \frac{2M}{z} + H_I^2 z^2$


B
A
z=0
X_L=0

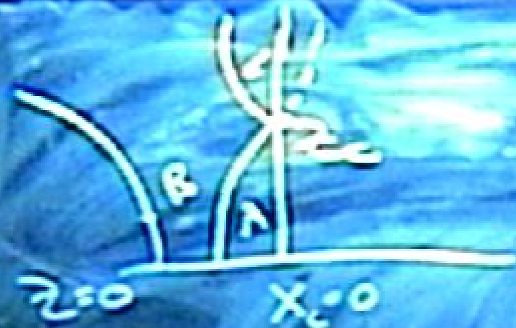

B
A
z=0
X_c=0
J.C. → Match z



I.C. → Match z , X_B ≠ X_C
A : HdS - a_A = 1 + H_A^2 z^2
z=∞ ~ H_2
z=0
X_c=0
B
A

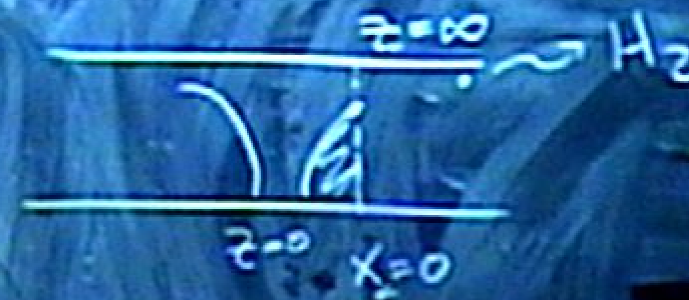


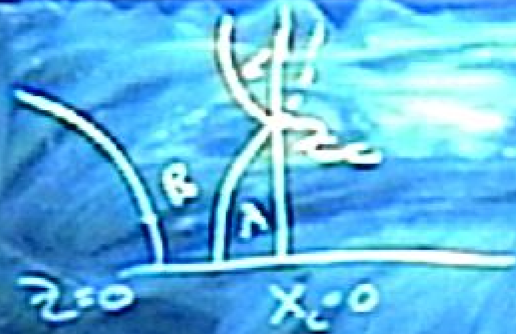
z=0
X_c=0
D.C. → Match z , X_B ≠ X_c
A : HdS - a_A = 1 + H_A^2 z^2
z=∞
H_2
z=0



J.C. $\to$ Match z, $X_B \neq X_c$

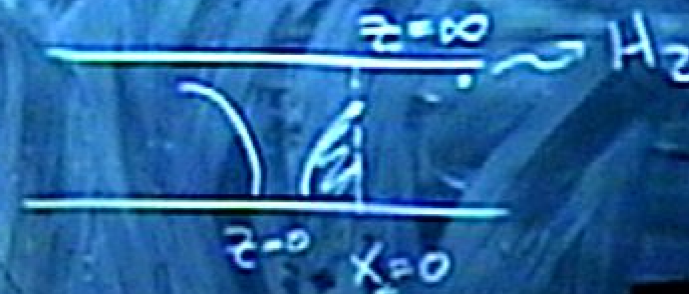
$\underline{A}$: $HdS - a_A = 1 + H_A^2 z^2$

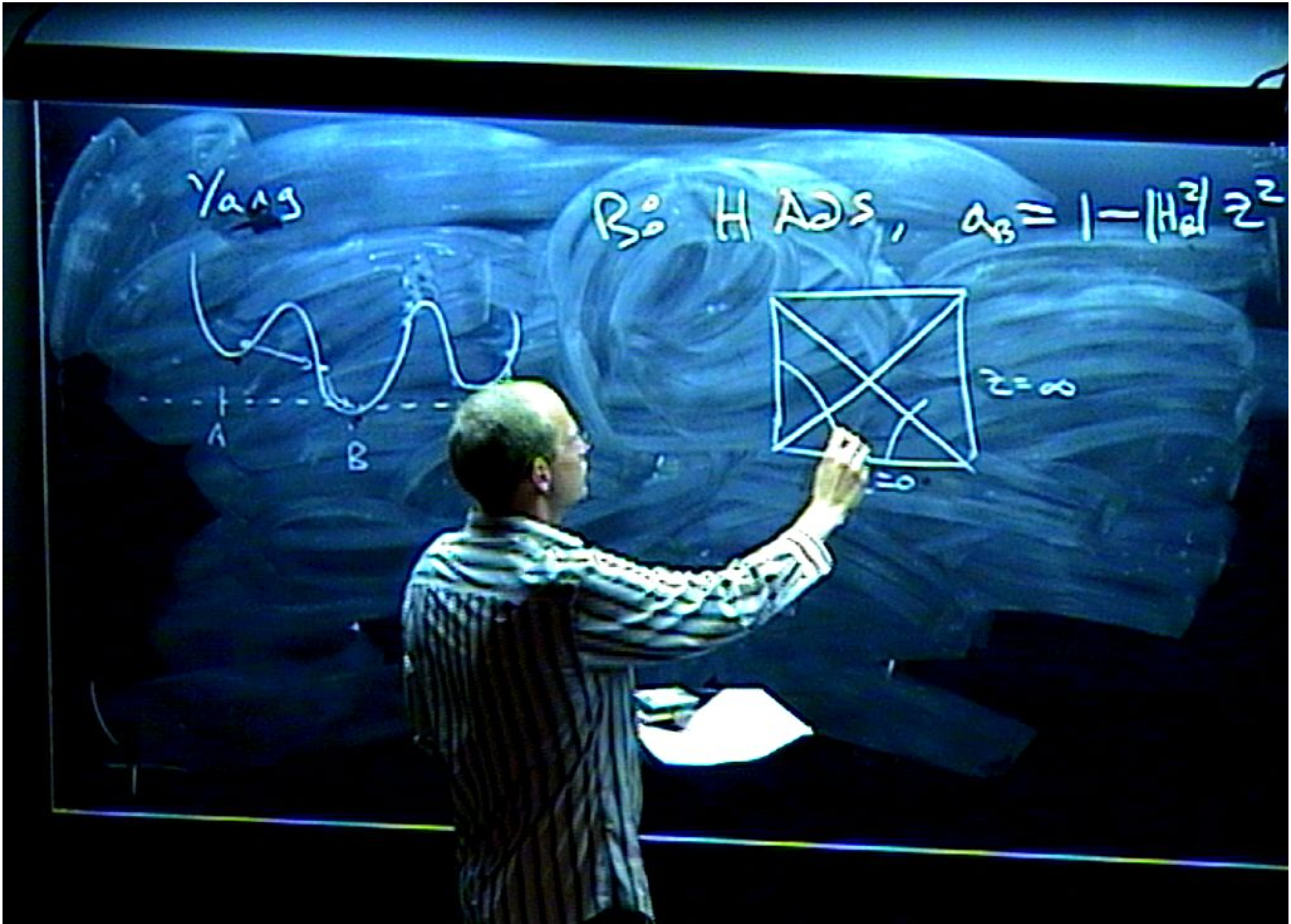


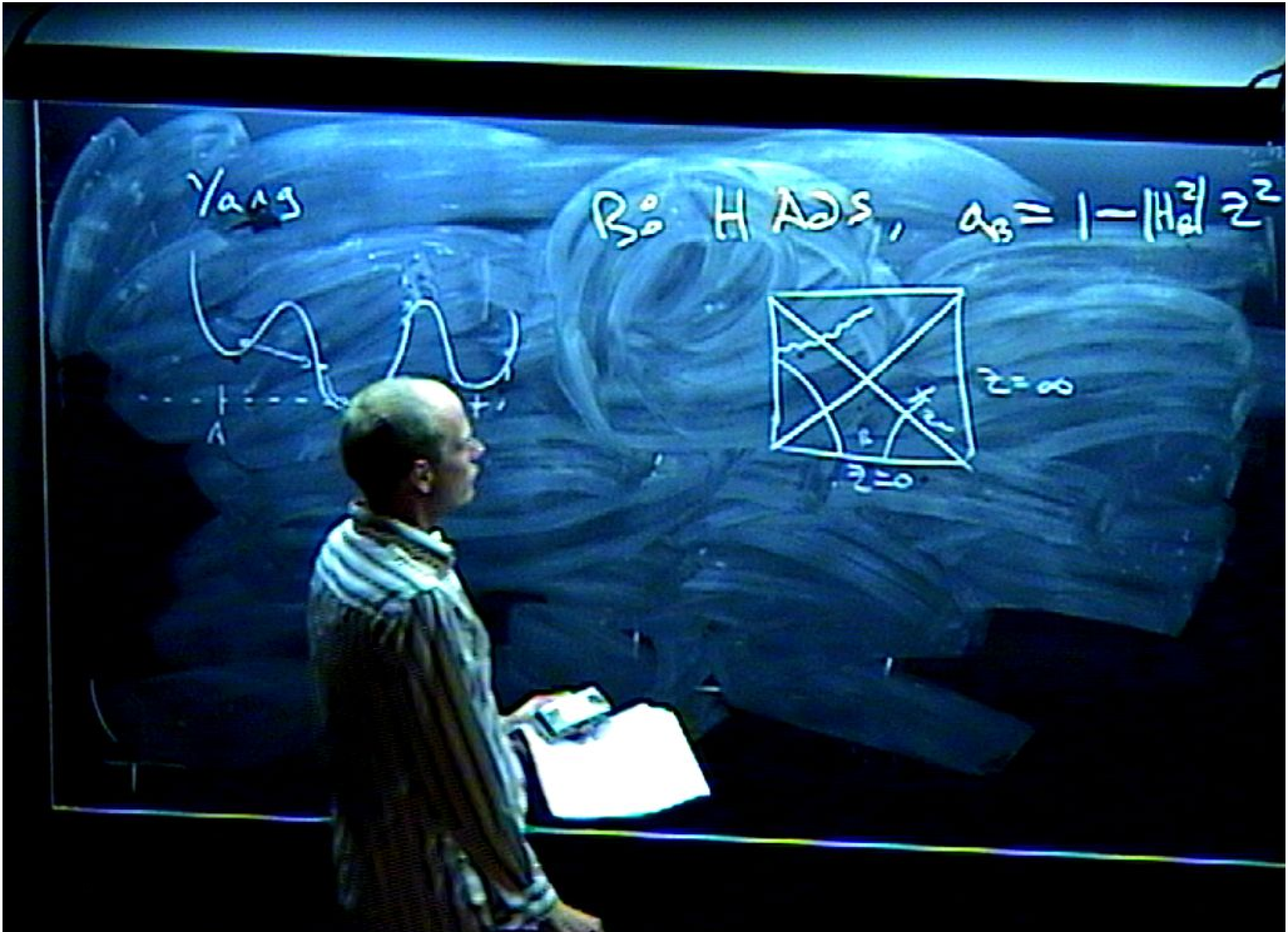


D.C. $\rightarrow$ Match z, $X_B \neq X_c$

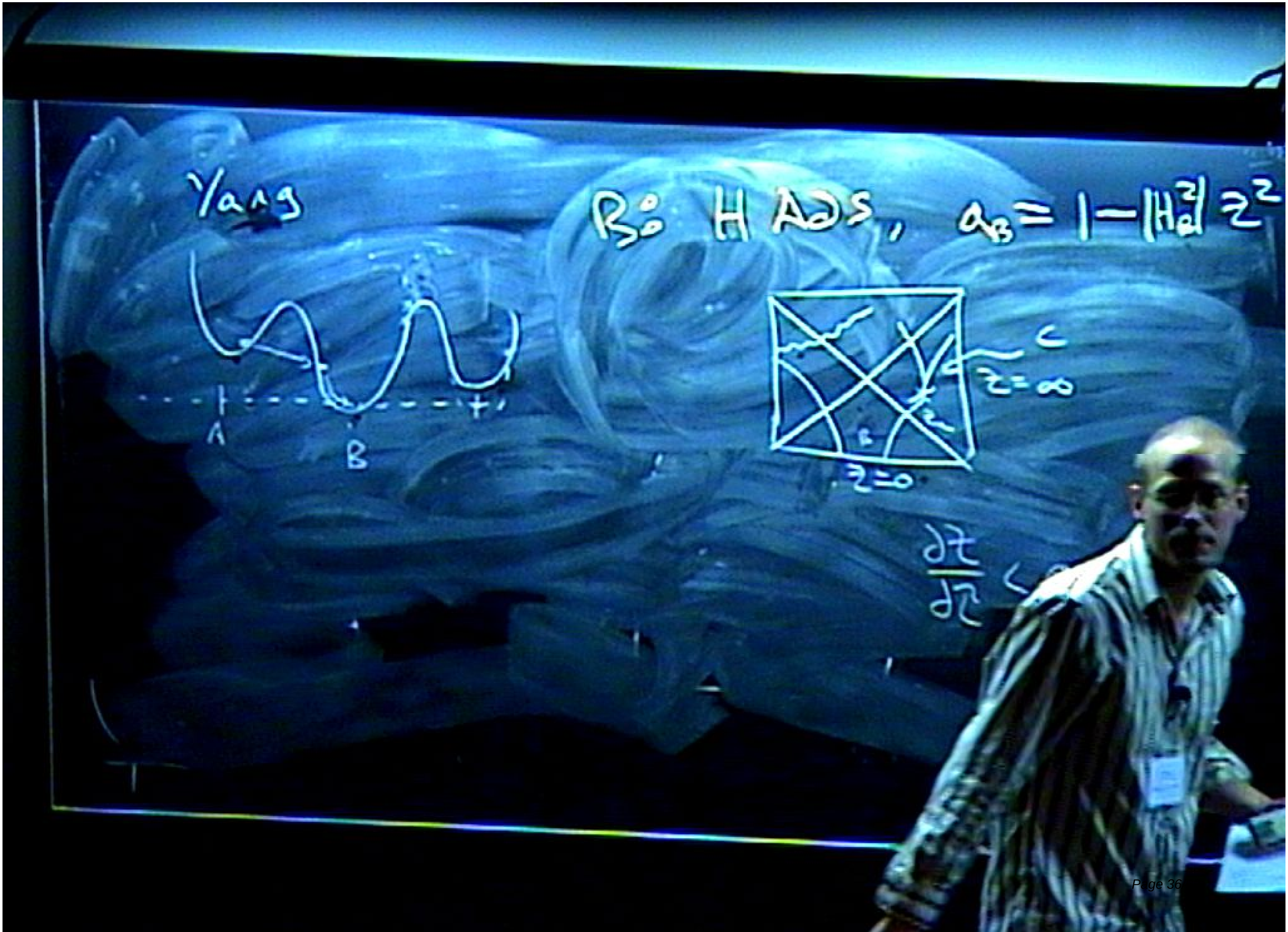
$\underline{A}$: HdS $- \; a_A = 1 + H_A^2 z^2$

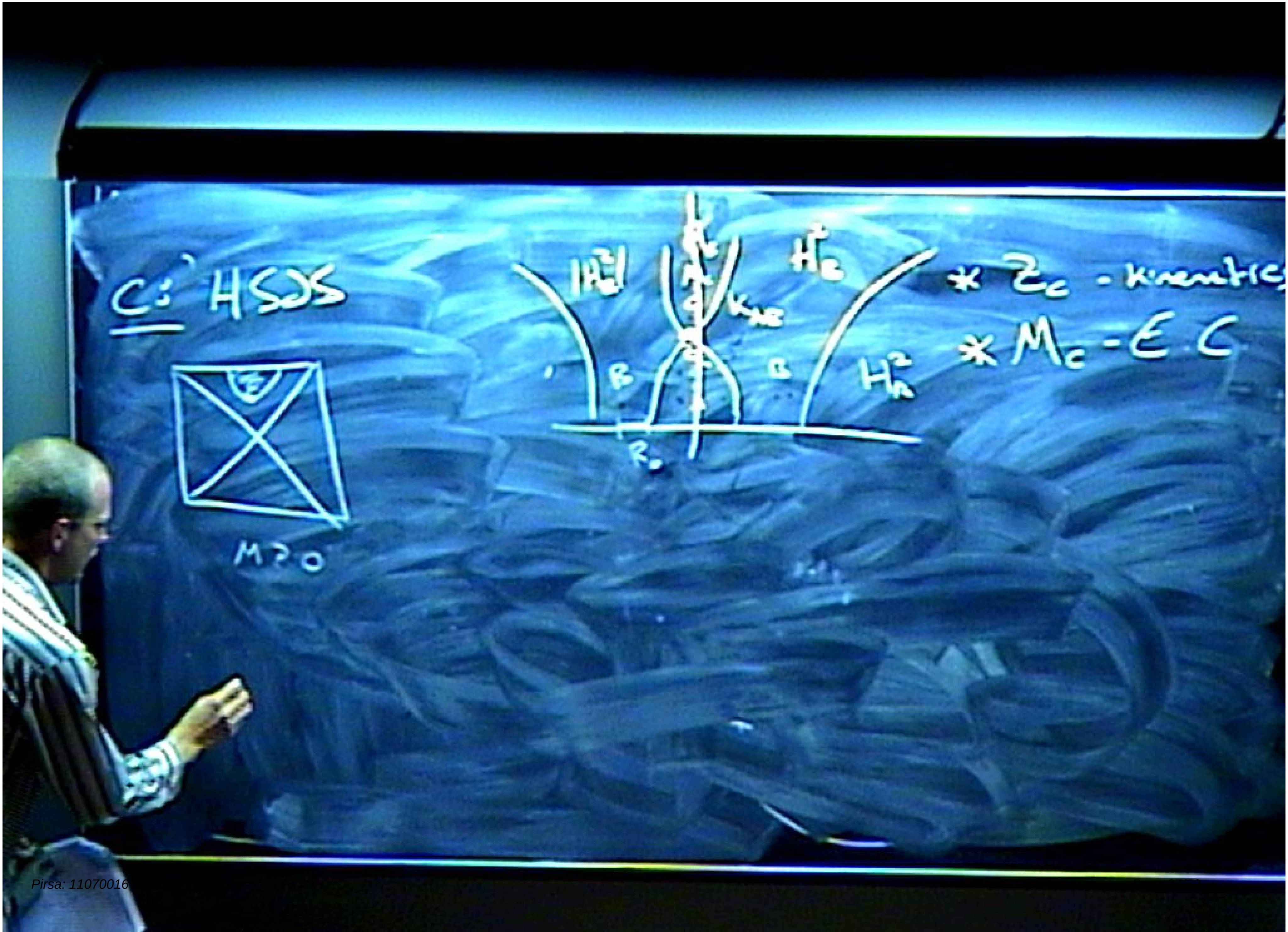


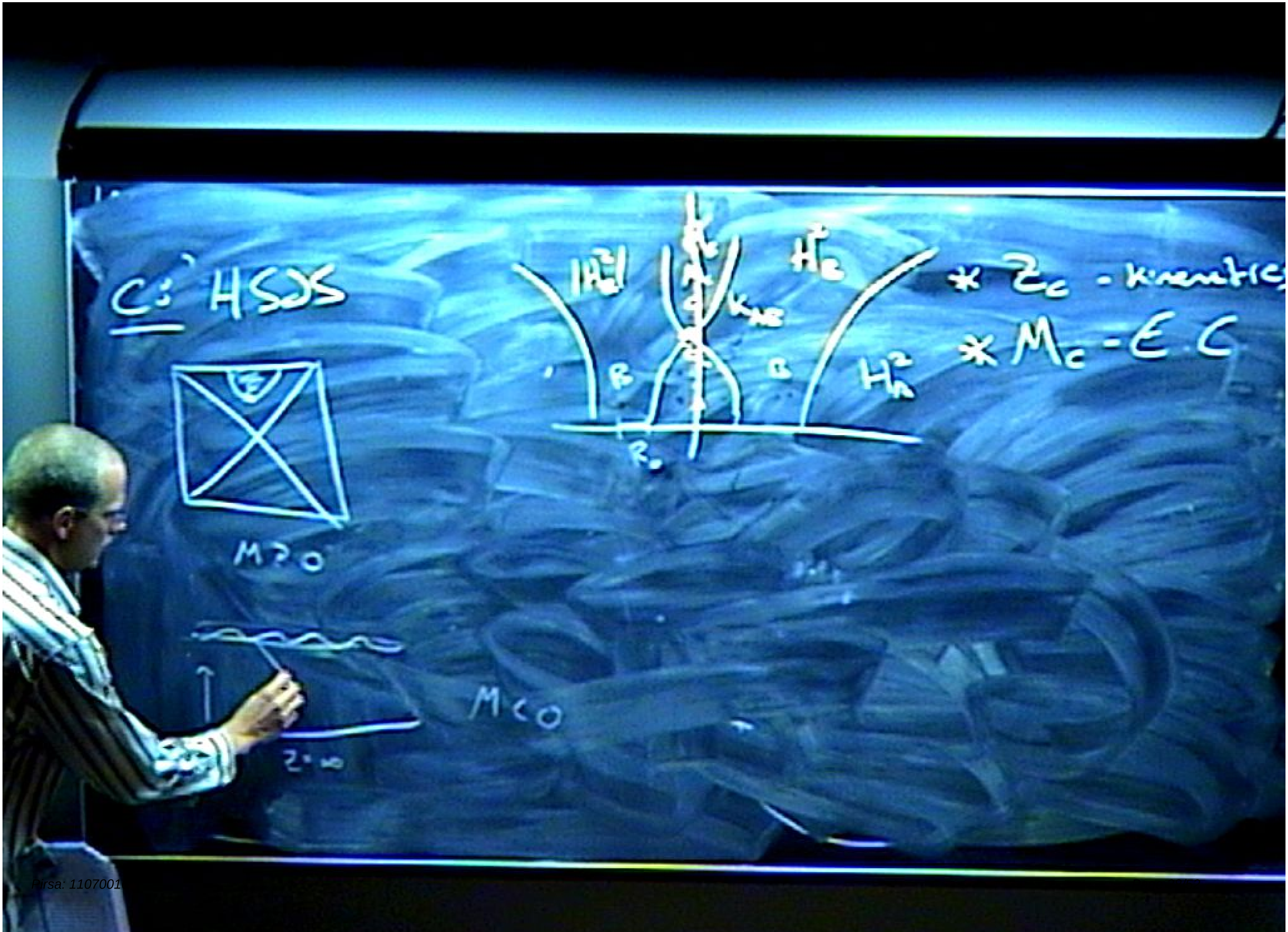

Yang
A
B
B: H AdS, a_B = 1 − |H_d|^2 z^2
z = ∞
z = 0



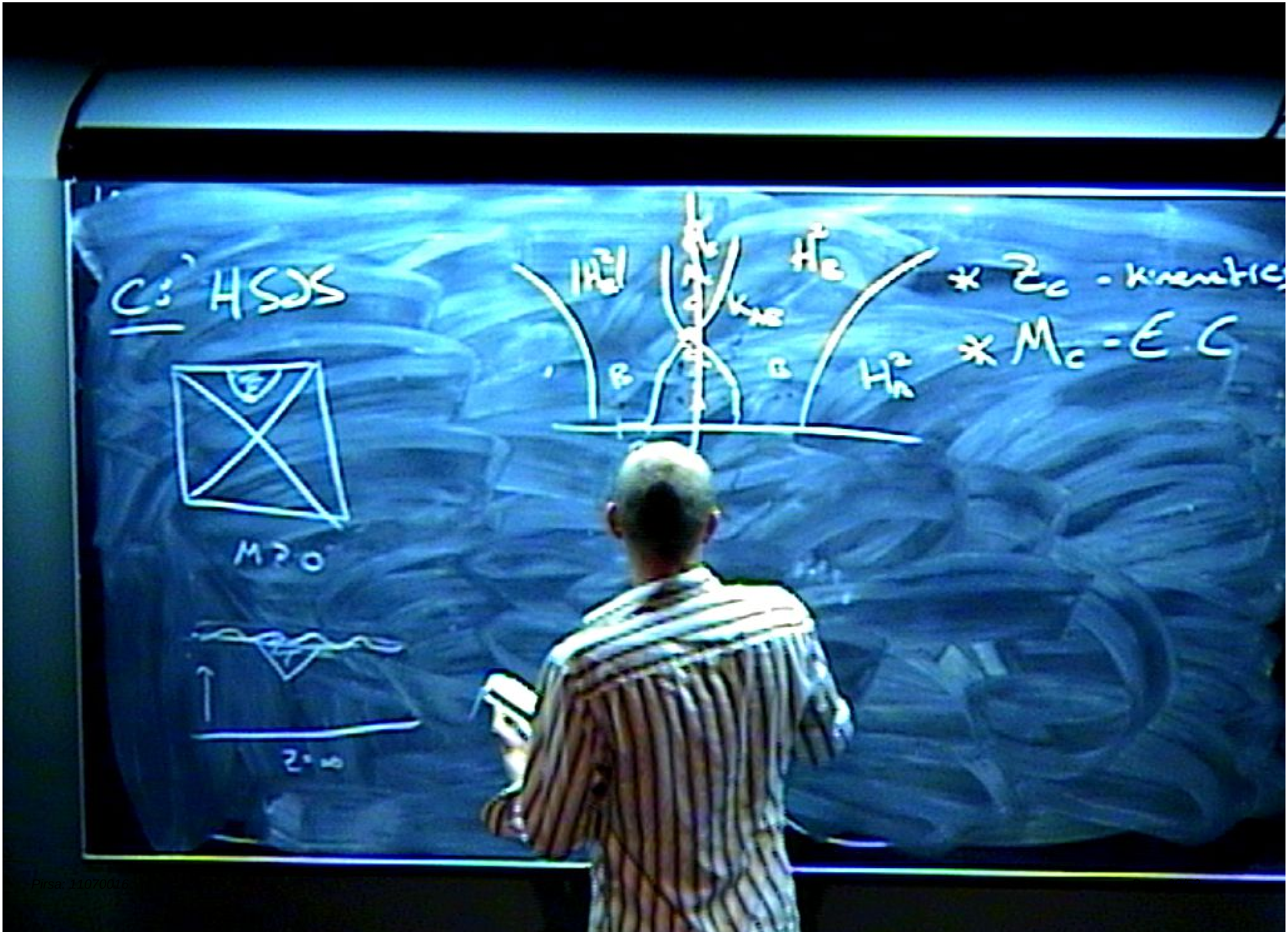
Yang
B: H AdS, $a_B = 1 - |H_d^2| z^2$
$z=\infty$
$z=0$

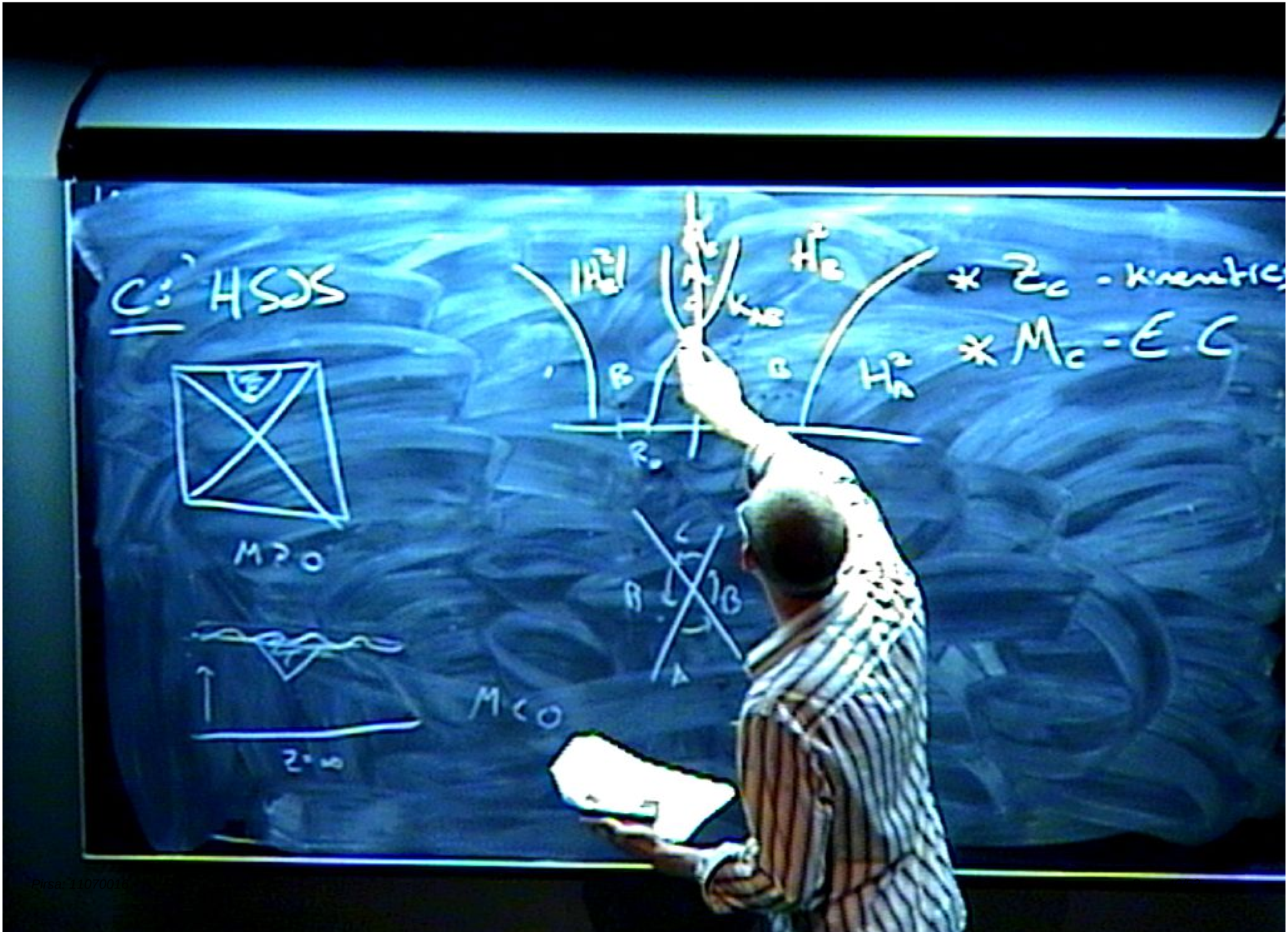

Yang
B: H AdS, a_B = 1 − |H_d|^2 z^2
A
B
C
z=∞
z=0

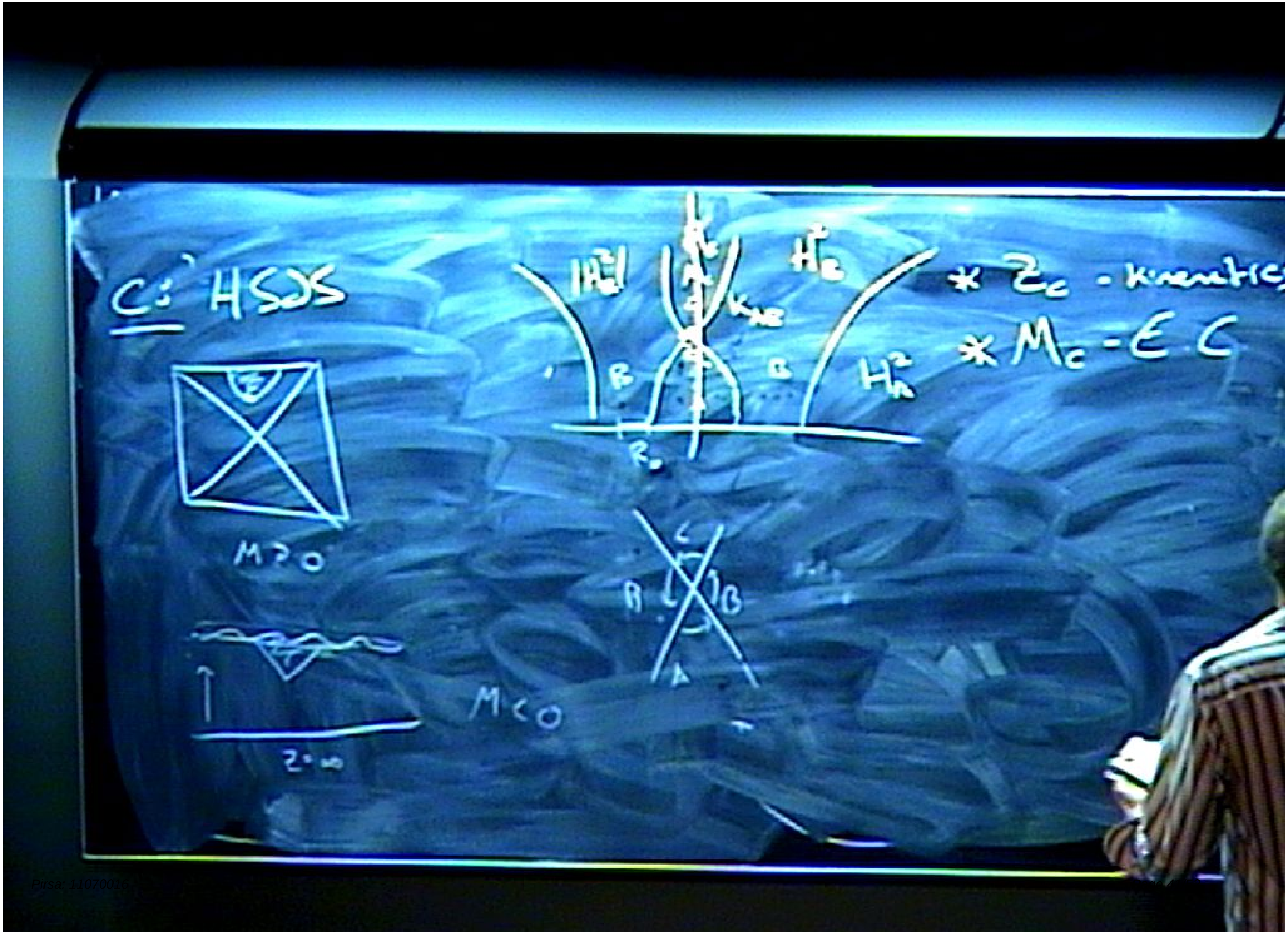

C: HSDS
M?O
* Z_c - kinematics
* M_c - E.C
R_0



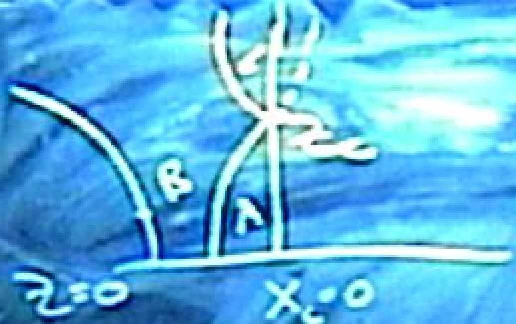
C: HSDS
M>0
M<0
* Zc - kinematics
* Mc - E.C


C: HSDS
M>0
* Mc - E.C


C: HSDS
M > 0
M < 0
* Z_c - kinematics
* M_c - E.C

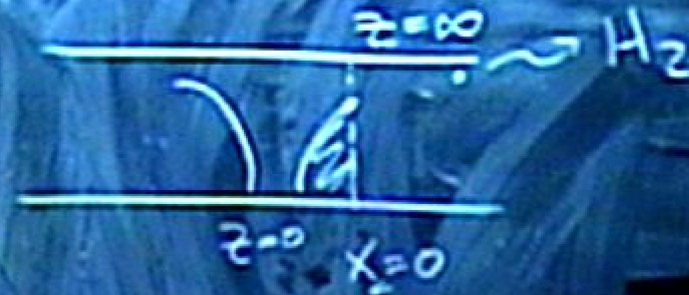


C: HSDS
M>0
M<0
* Z_c - kinematics
* M_c - E.C

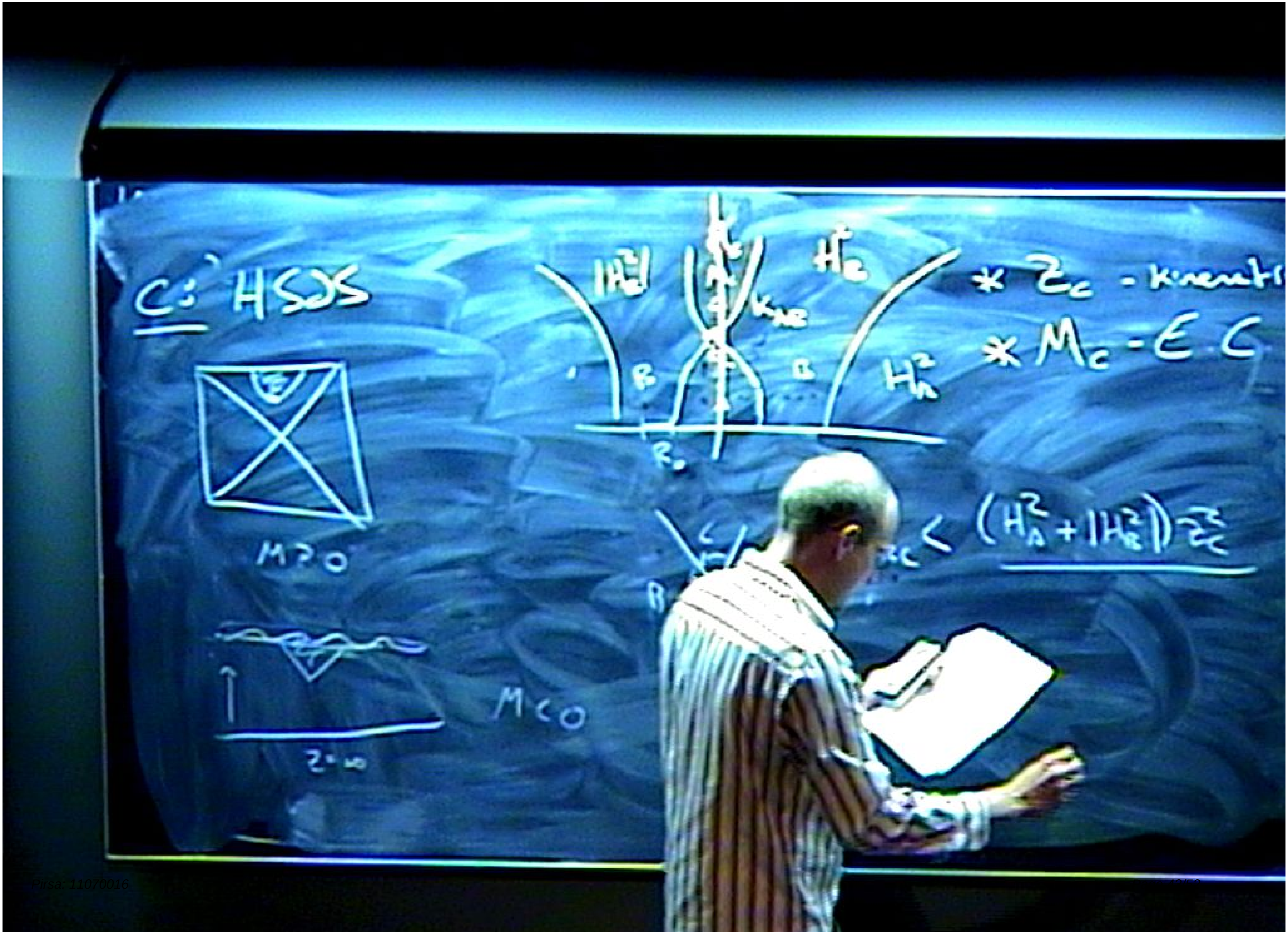


I.C. → Match z, $X_B \neq X_C$

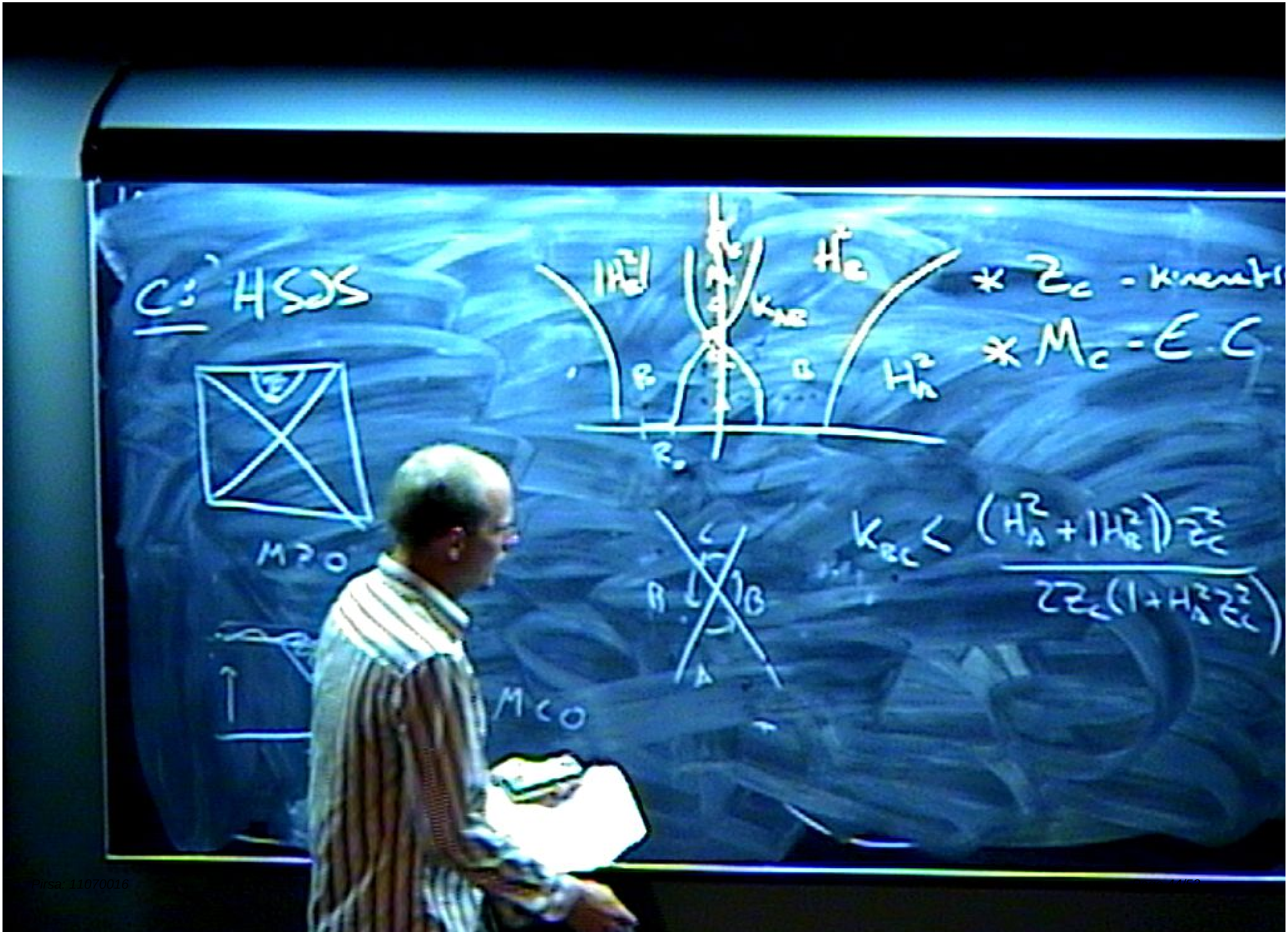
$\underline{A}$: HdS $- \; a_A = 1 + H_A^2 z^2$

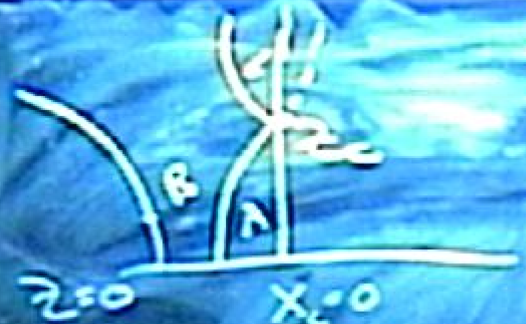


① Repulsive domain walls



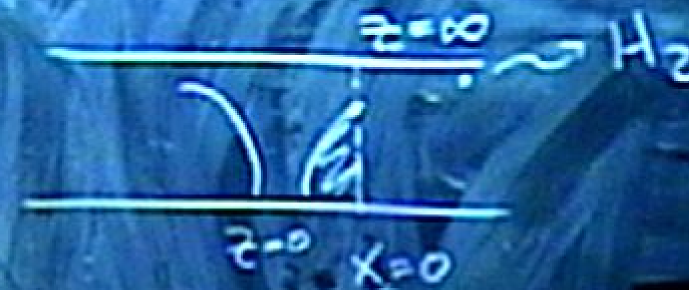
M > 0
M < 0


C: HSDS
M>0
M<0
* Z_c - kinemati
* M_c - ε·C
K_BC < (H_A^2 + |H_B^2|) z_c^2 / 2z_c(1 + H_A^2 z_c^2)



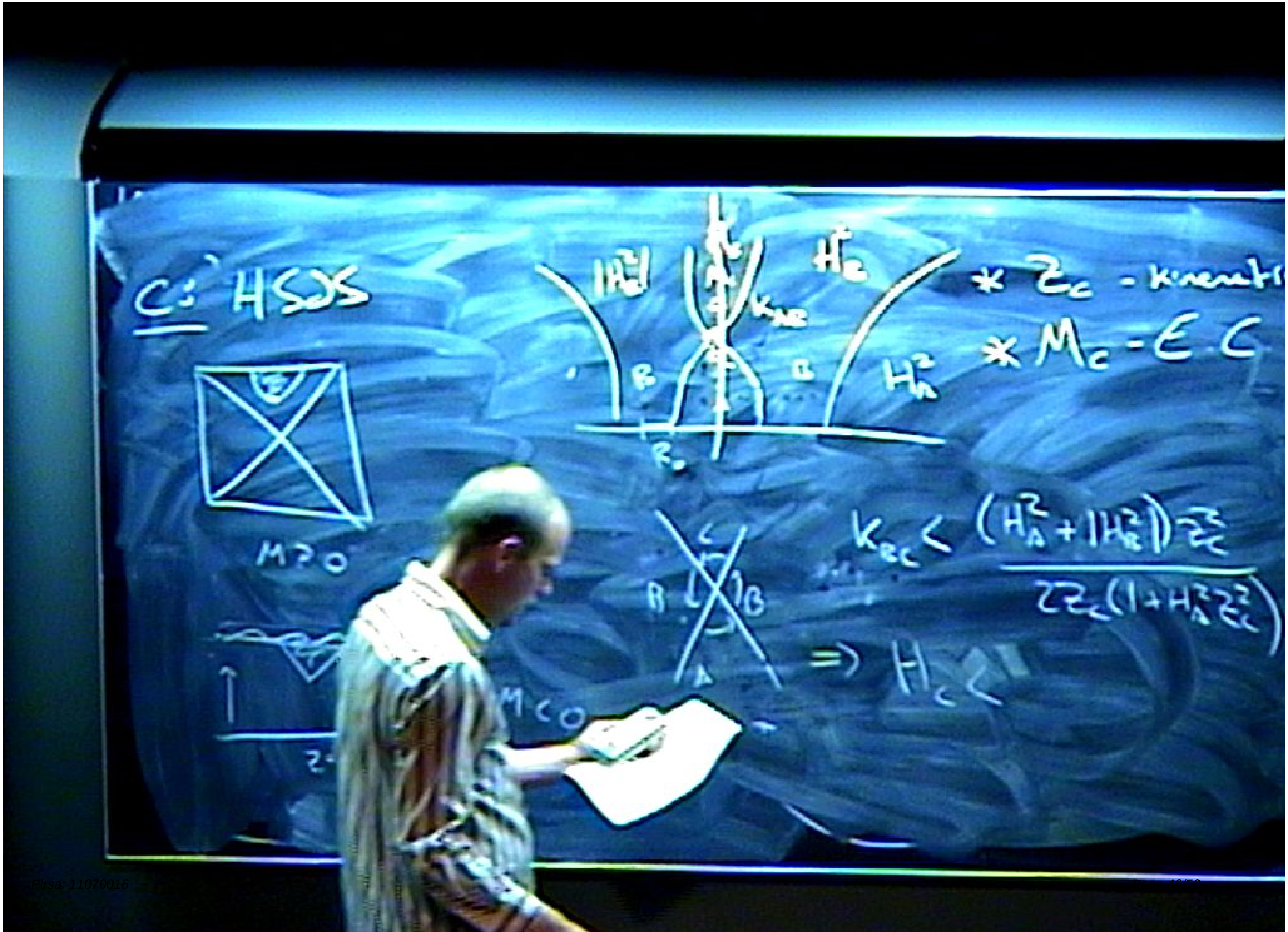
). C. → Match z, $X_B \neq X_C$

<u>A</u> : HdS - $a_A = 1 + H_A^2 z^2$

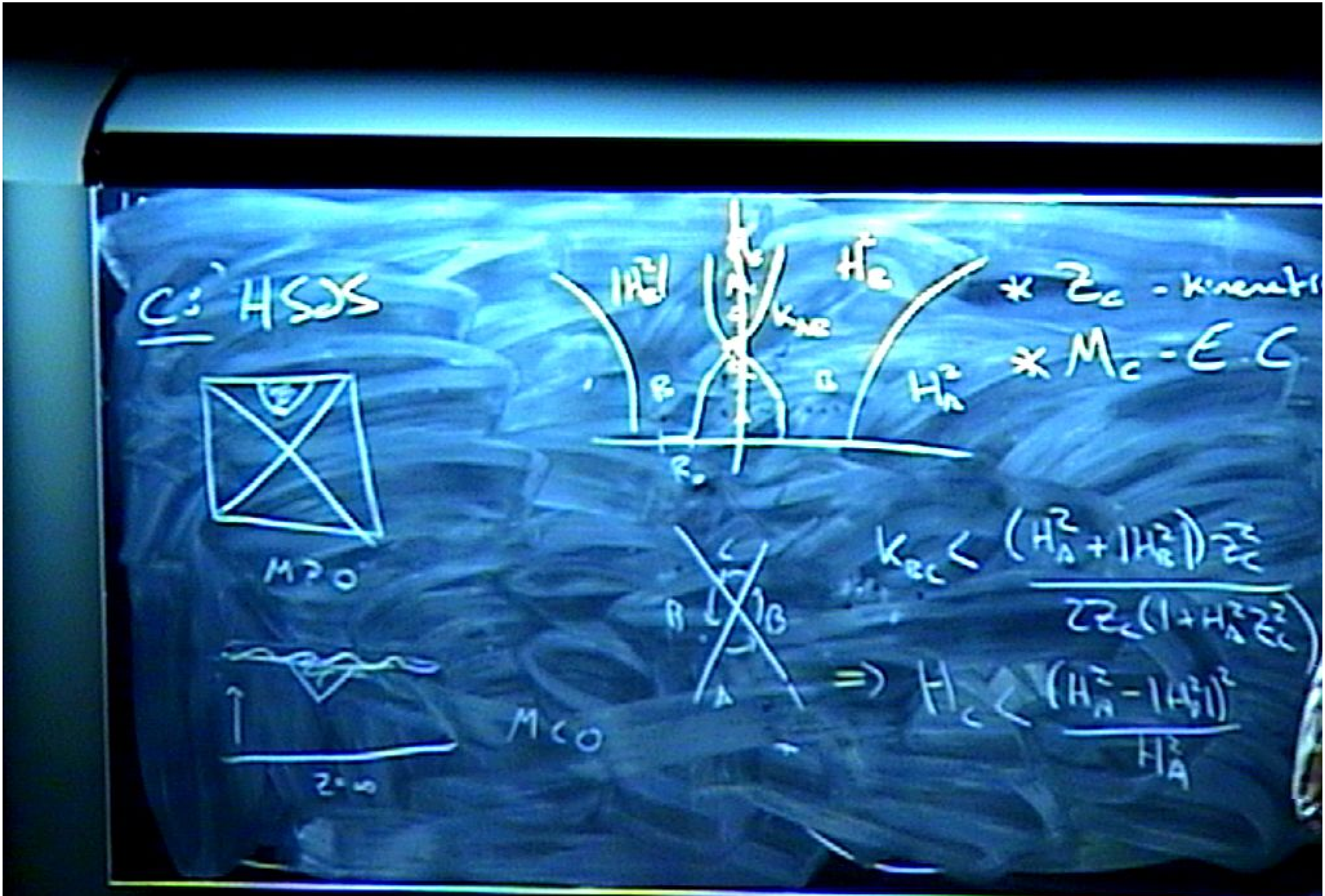


① Repulsive domain walls

$$K_{BC} > H_C^2 + |H_B^2|$$



C: HSDS
M > 0
M < 0
* Z_c - kinemati
* M_c - ε C
K_BC < (H_A^2 + |H_B^2|) Z_c^2 / 2Z_c(1 + H_A^2 Z_c^2)
⇒ H_c <

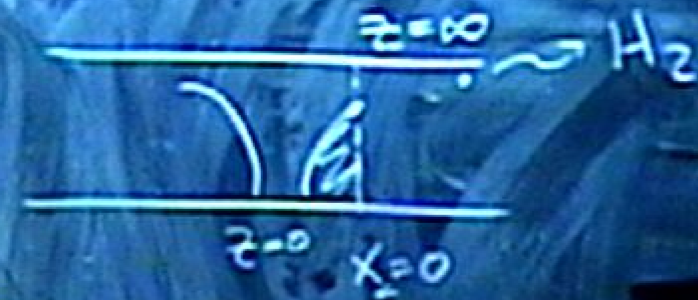


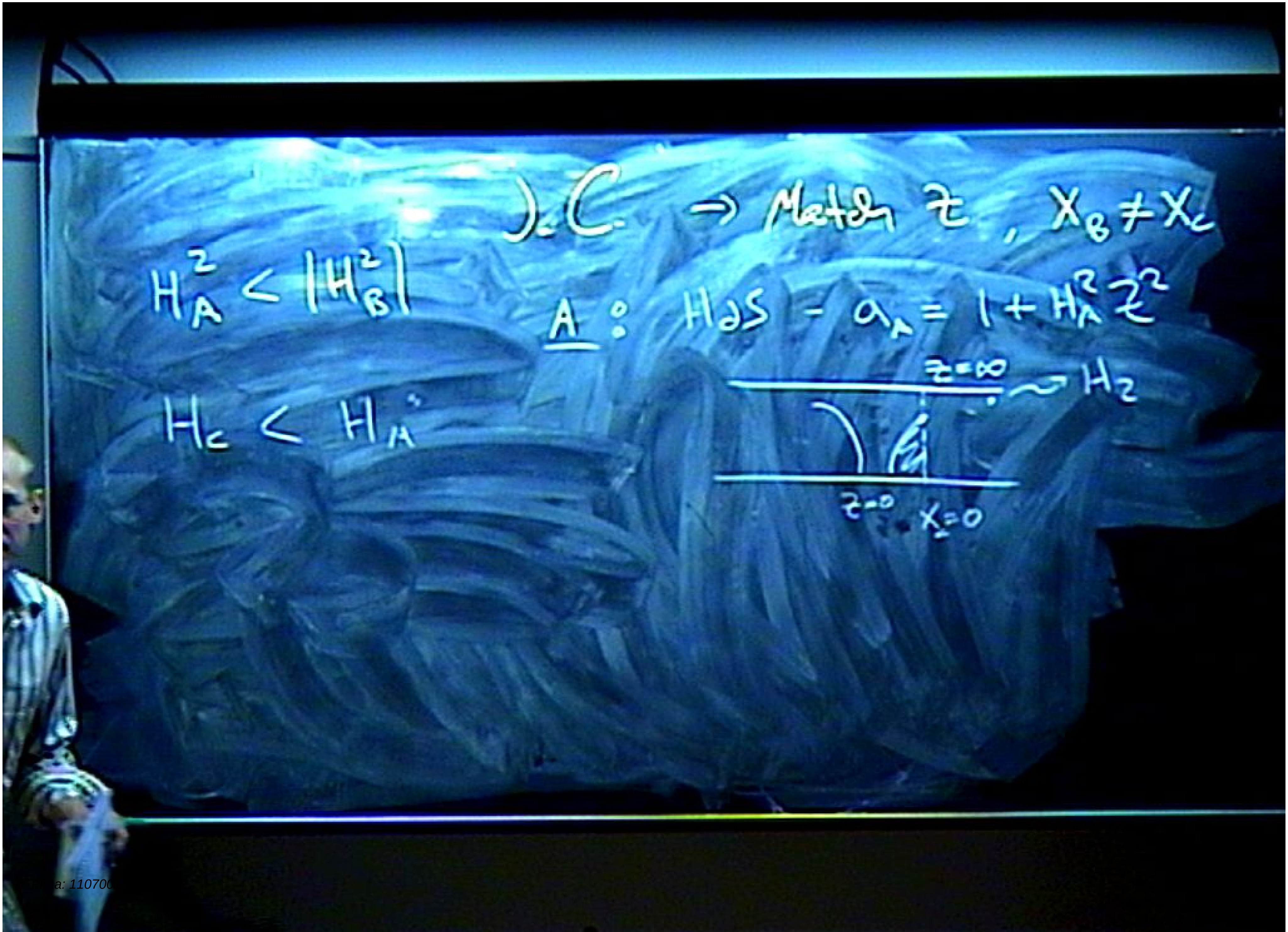
C: HSdS
M > 0
M < 0
z = ∞
$|H_B^2|$
H_B^2
H_A^2
K_{AB}
R_0
A
B
C
* z_c - kinemati
* M_c - ε C
$K_{BC} < \frac{(H_A^2 + |H_B^2|)\, z_c^2}{2 z_c (1 + H_A^2 z_c^2)}$
$\Rightarrow H_c < \frac{(H_A^2 - |H_B^2|)^2}{H_A^2}$

J.C. → Match z, $X_B \neq X_C$

$H_A^2 < |H_B^2|$

A : HdS - $a_A = 1 + H_A^2 z^2$




J.C. → Match z , X_B ≠ X_c
H_A^2 < |H_B^2|
H_c < H_A
A : HdS - a_A = 1 + H_A^2 z^2
z=∞
H_2
z=0
x_2=0

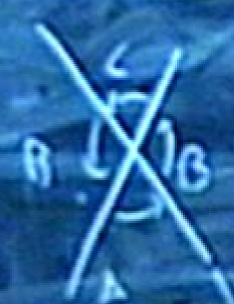
C: HSdS

M > 0

M < 0

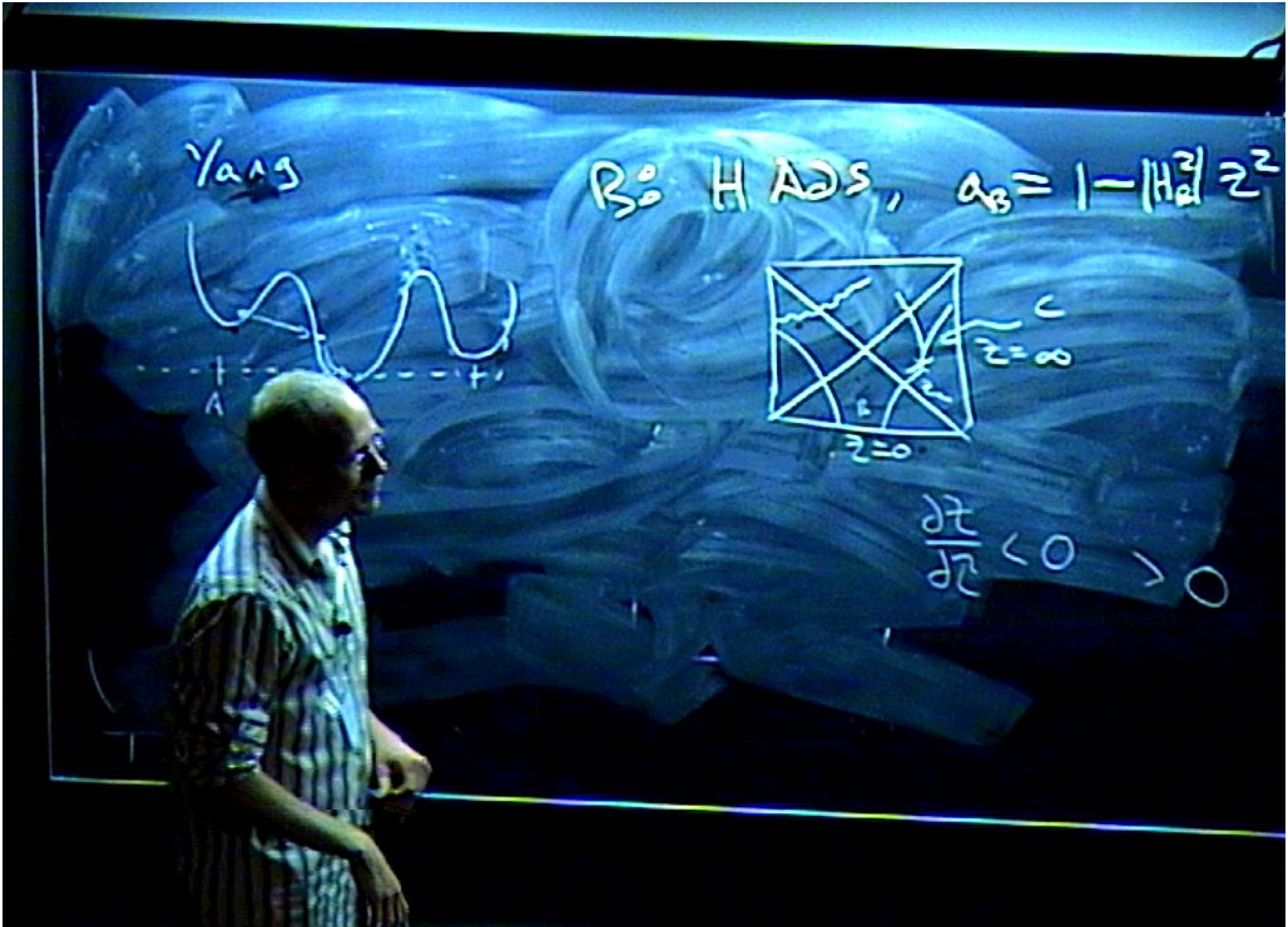
* z_c - kinemati

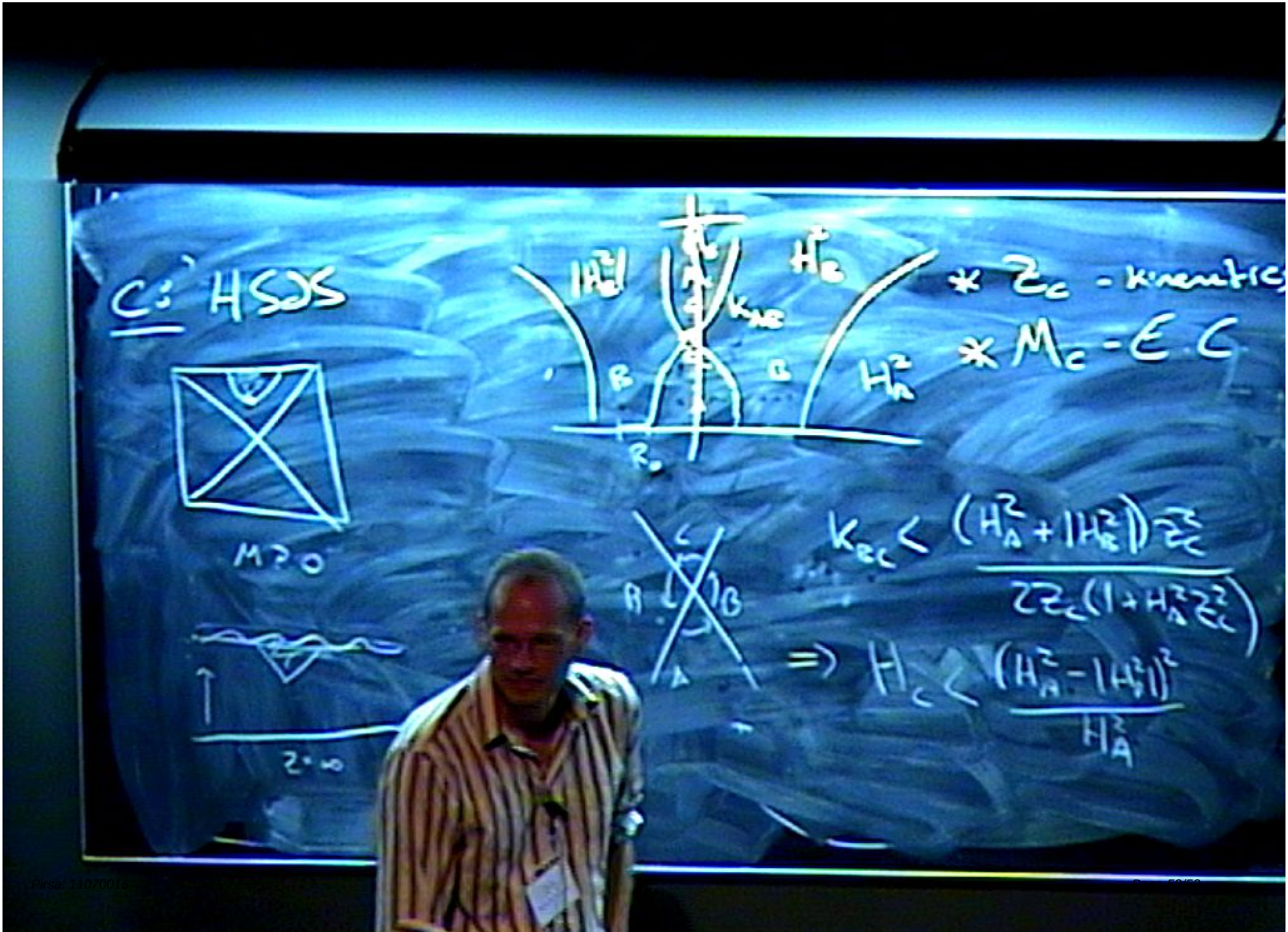
* M_c - $\epsilon \cdot C$



$$K_{BC} < \frac{(H_A^2 + |H_B^2|)\, z_c^2}{z z_c (1 + H_A^2 z_c^2)}$$

$$\Rightarrow H_c < \frac{(H_A^2 - |H_B^2|)^2}{H_A^2}$$


Yang
HAdS
z=∞
z=0


C: HSdS
* z_c - kinematics
* M_c - E.C
M > 0
K_BC < (H_A^2 + |H_B^2|) z_c^2 / 2z_c (1 + H_A^2 z_c^2)
=> H_c < (H_A^2 - |H_B^2|)^2 / H_A^2