

Title: Relativity 4

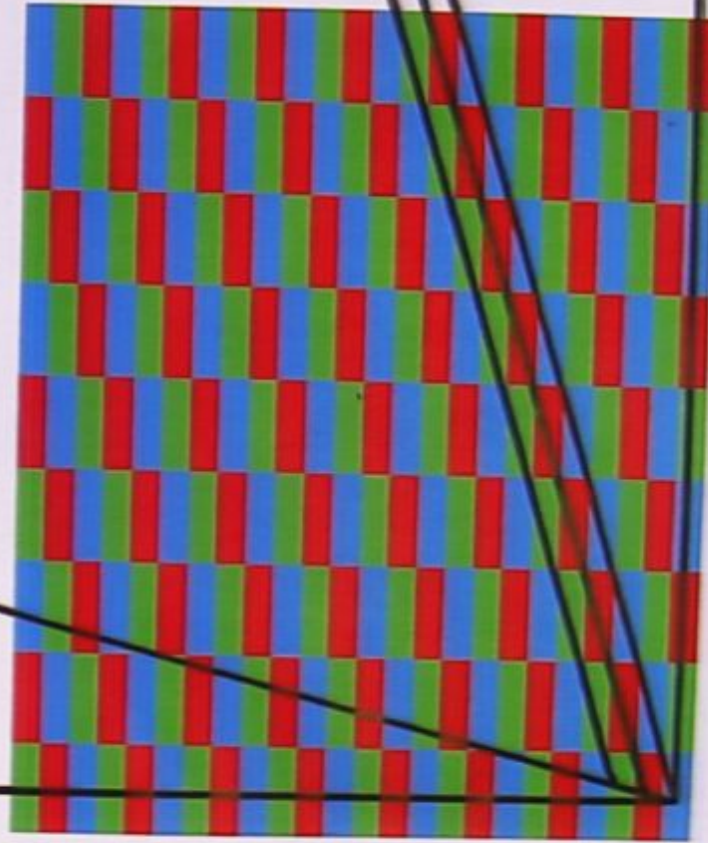
Date: Aug 13, 2008 09:00 AM

URL: <http://pirsa.org/08080017>

Abstract:

ct<sub>B</sub>

ct<sub>A</sub>



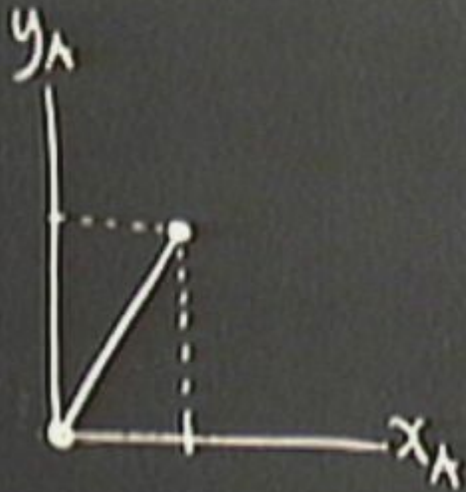
X<sub>B</sub>  
X<sub>A</sub>  
X<sub>B</sub>

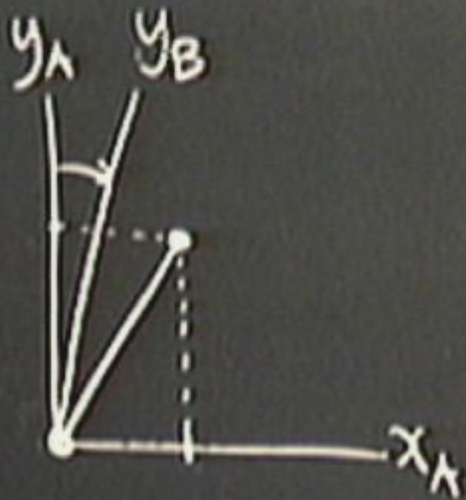
X

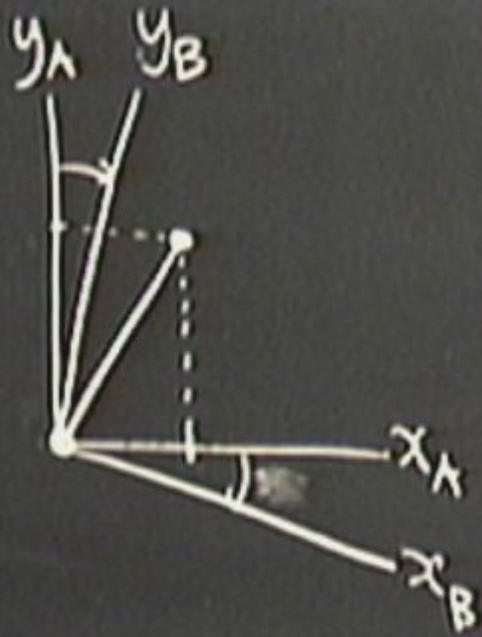


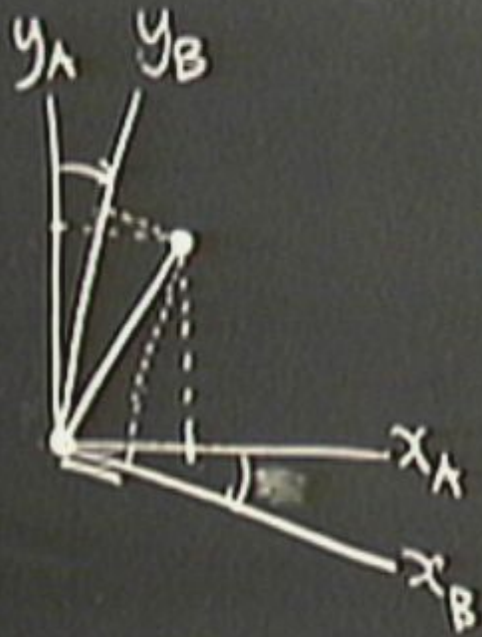
A hand-drawn coordinate system on a chalkboard. The vertical axis is labeled  $y_A$  and the horizontal axis is labeled  $x_A$ . The axes are drawn as simple lines meeting at an origin point.

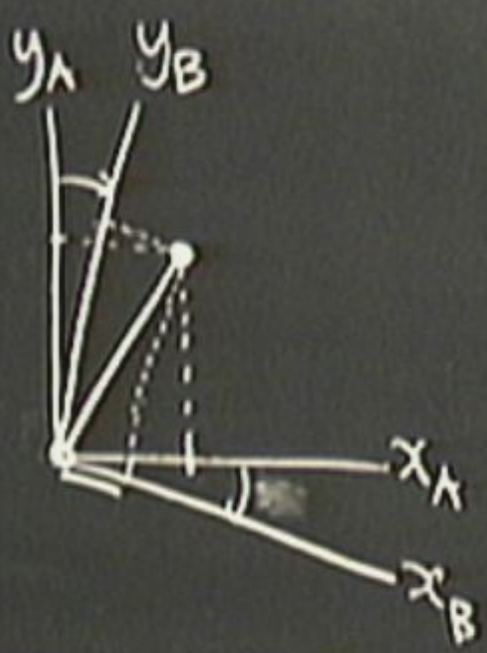
$x_A$











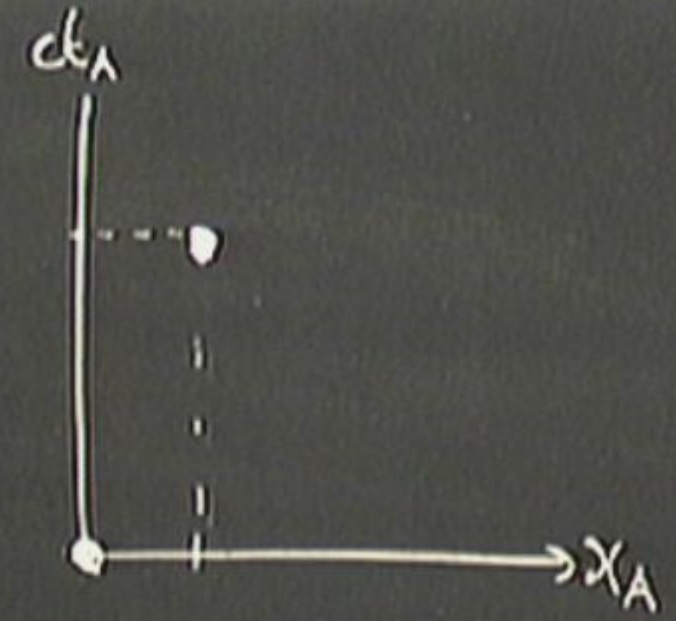
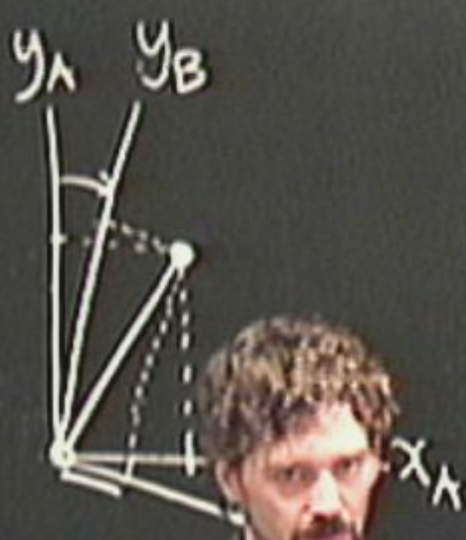
$dx_A$

$x_A$

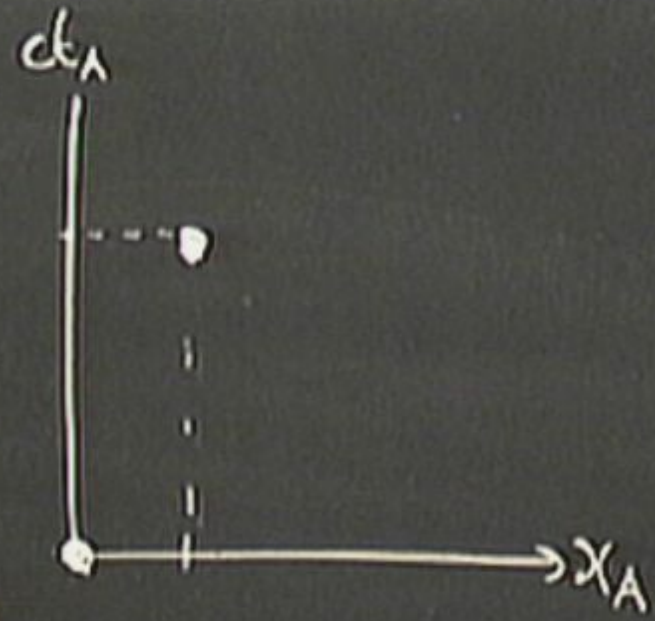
Eucl.







$y_A$   $y_B$



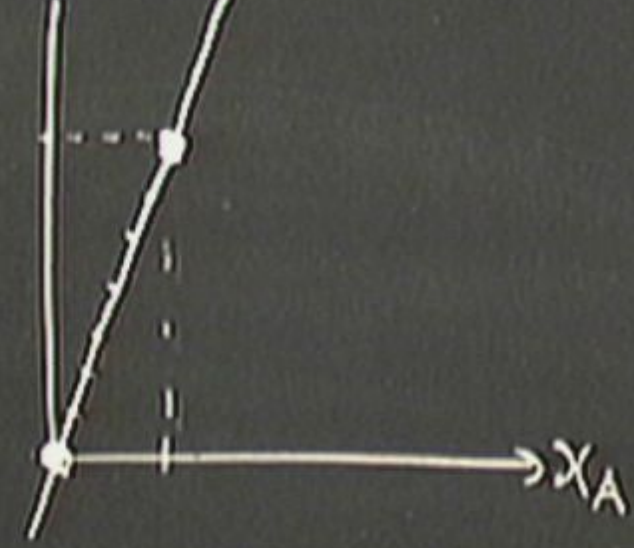
Eucl.



$y_A$   $y_B$



$ct_A$   $ct_B$

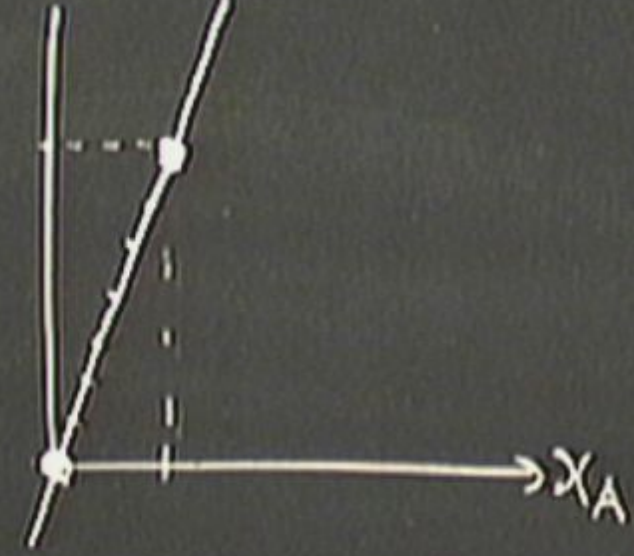


Euc

$y_A$   $y_B$



$ct_A$   $ct_B$



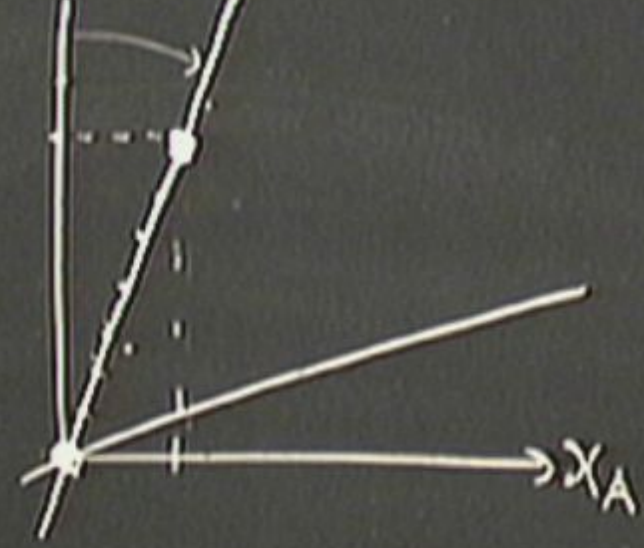
Eucl



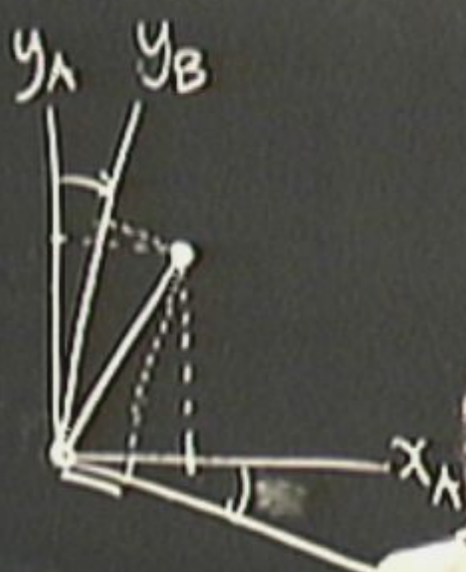
$y_A$   $y_B$



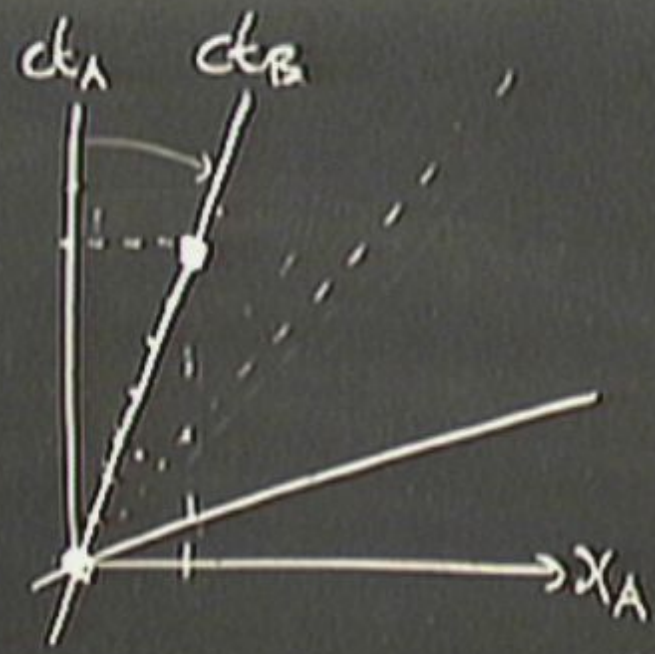
$ct_A$   $ct_B$

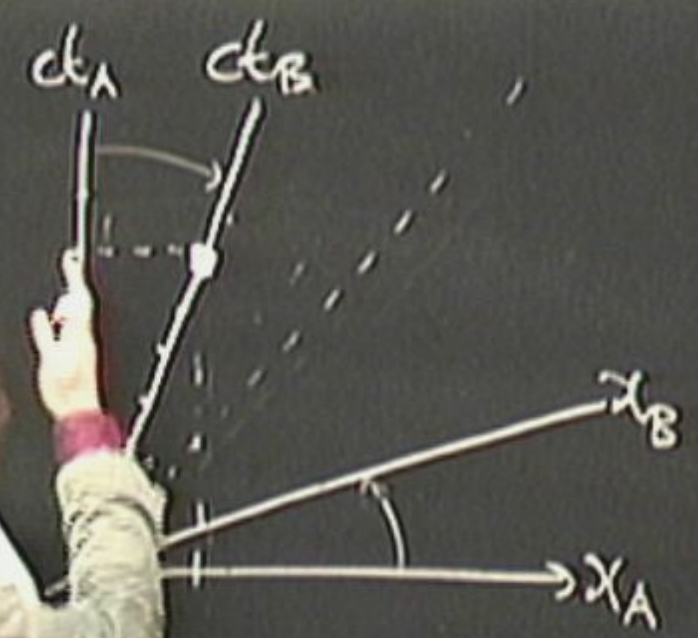
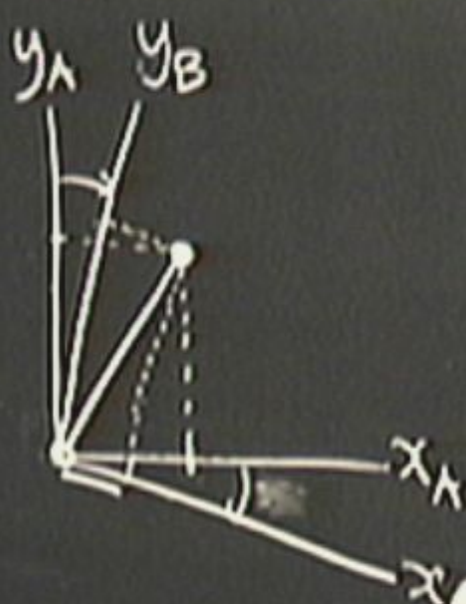


Eucl.

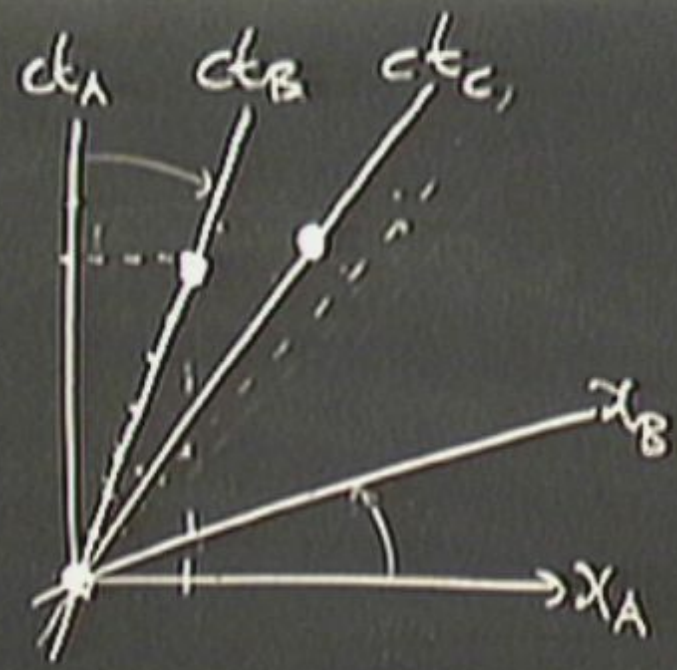


Eucl.



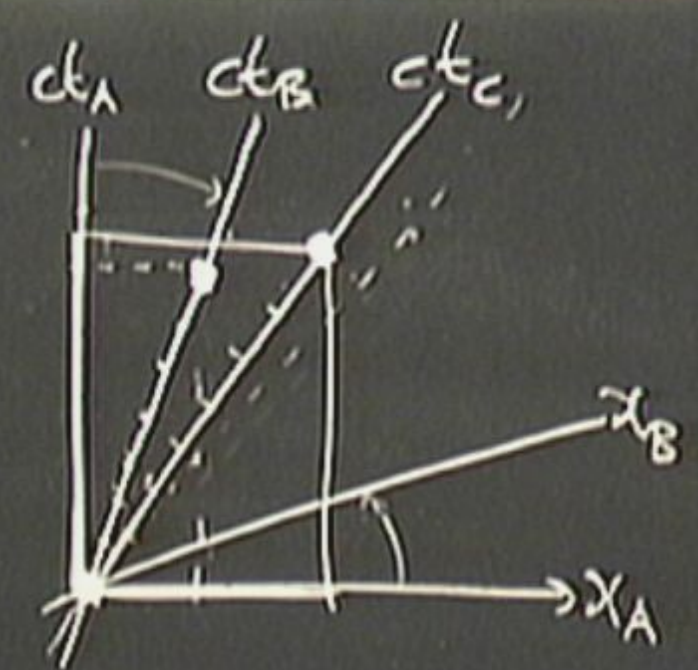
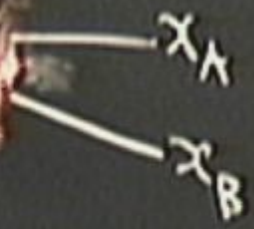


Eucl.

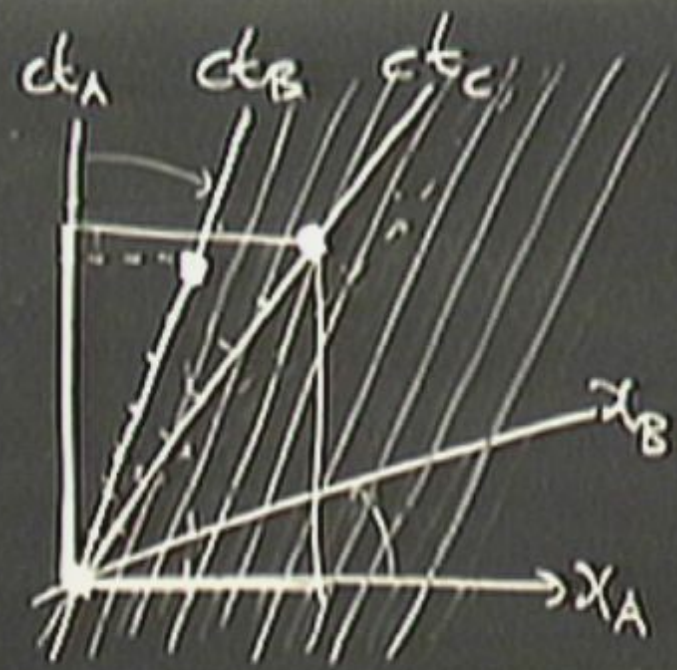


E

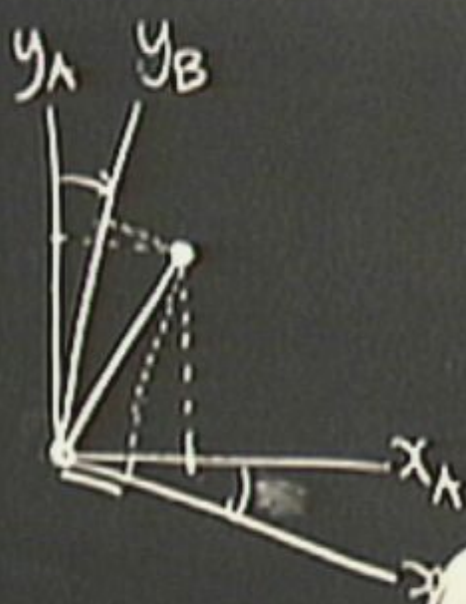




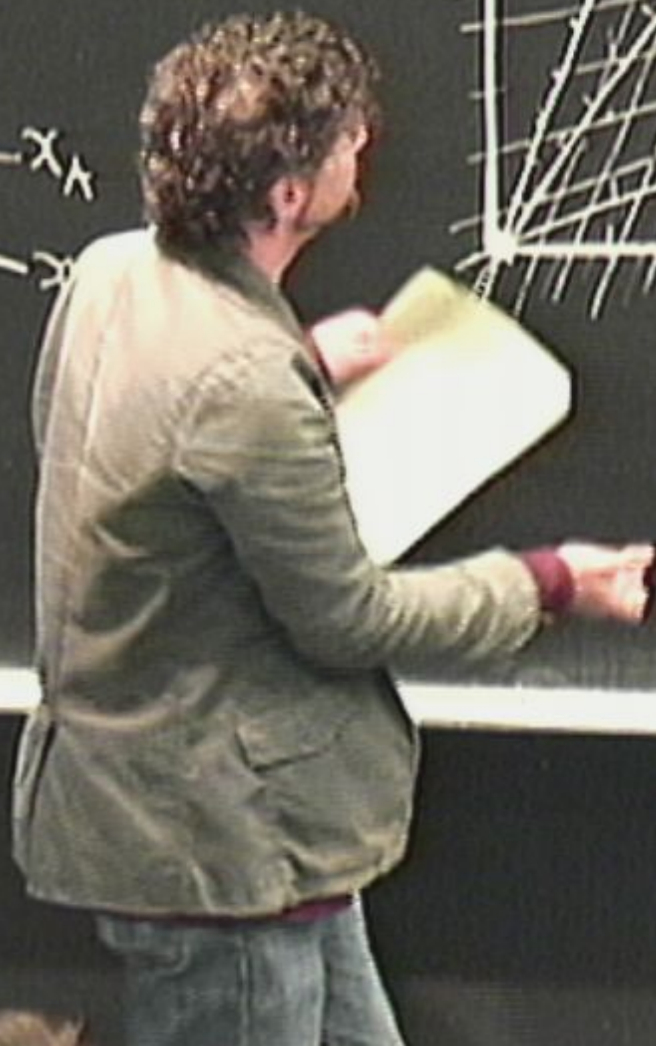
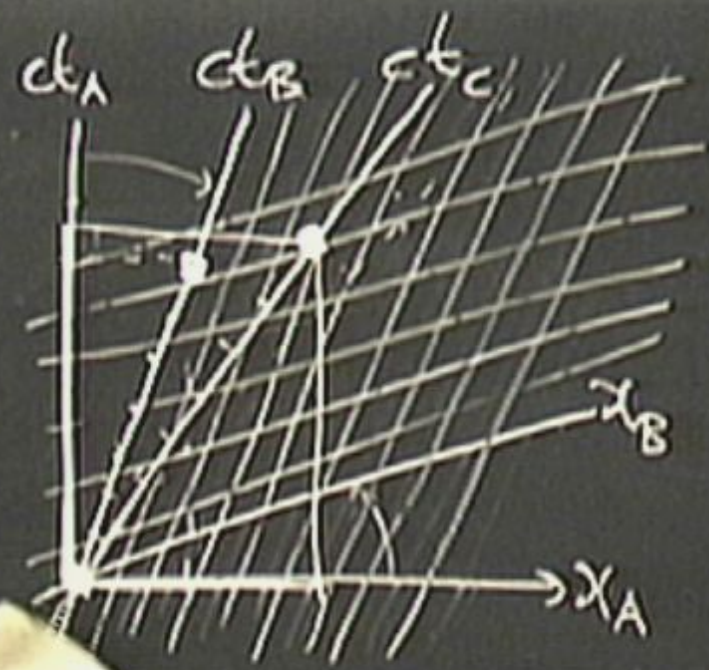
$y_A$   $y_B$

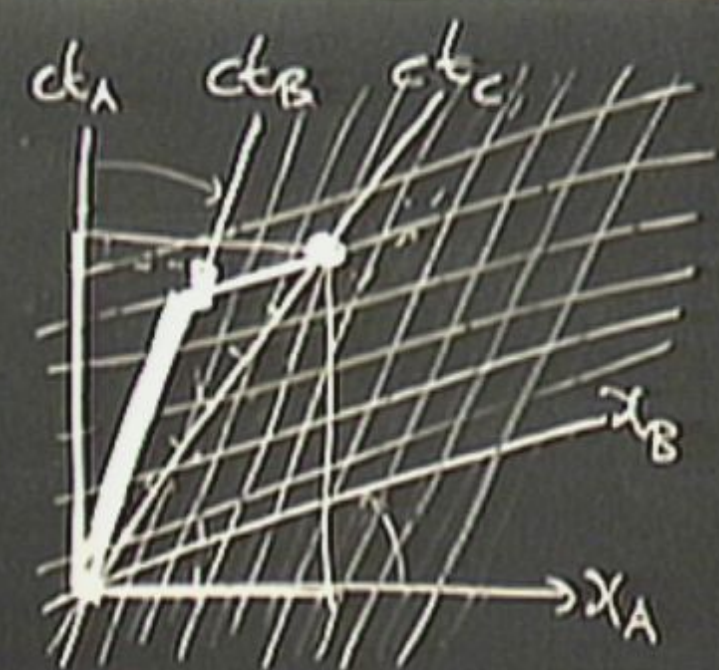
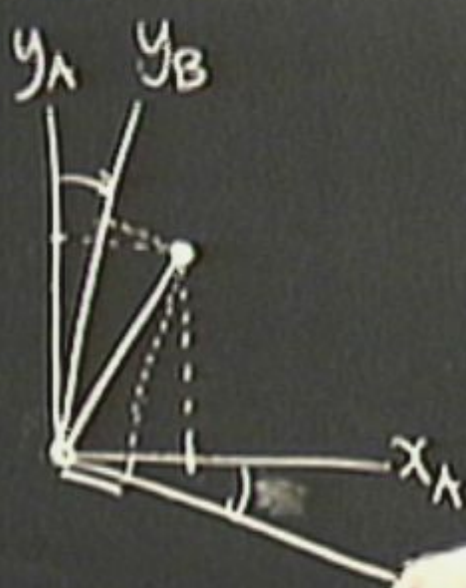


Eucl.



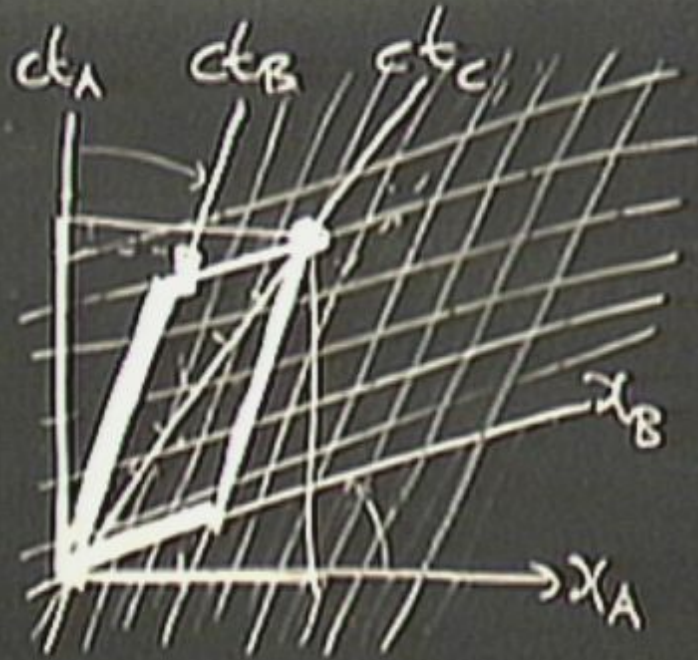
Eucl.





Eucl.

$y_A$   $y_B$



$E_C$

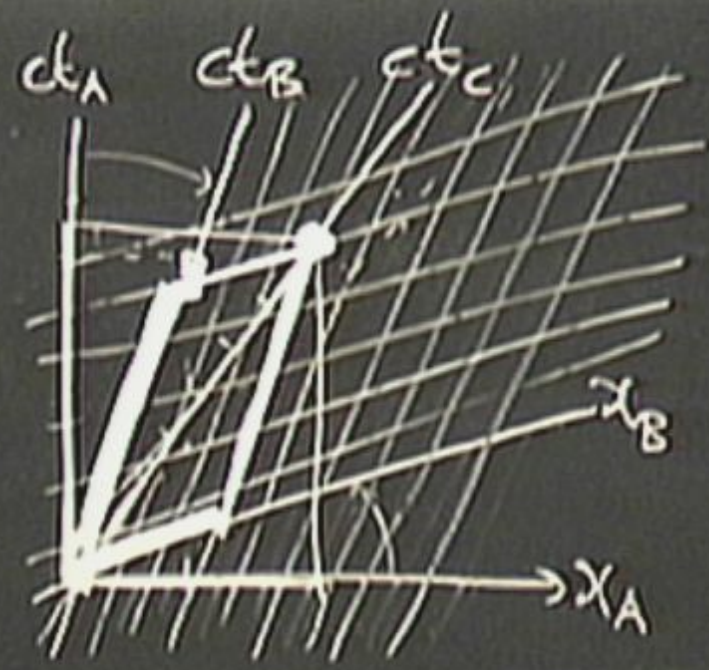
$B$

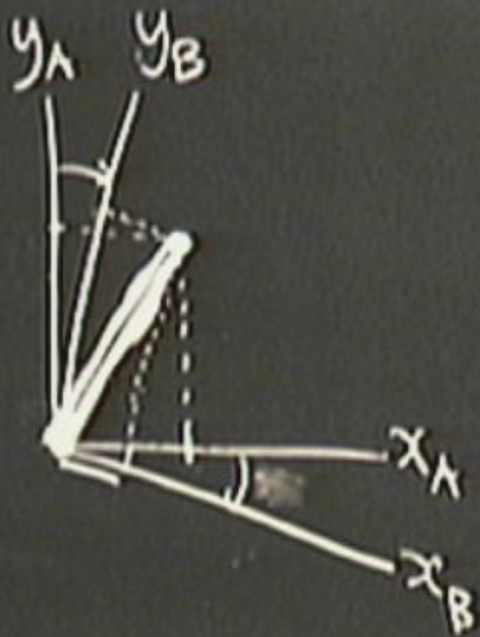
$y_A$   $y_B$



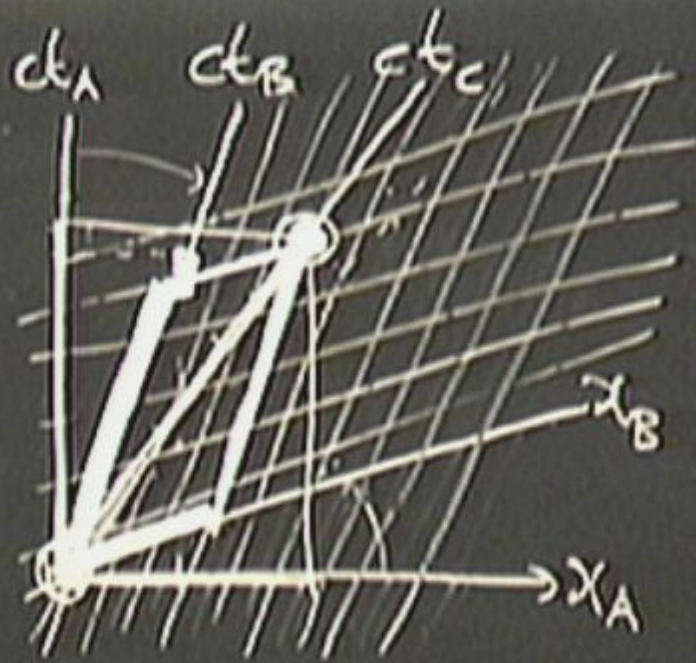
$x_A$

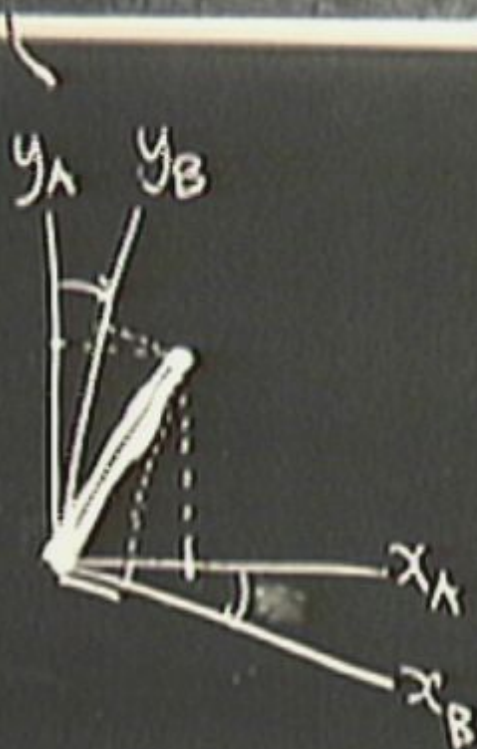
$x_B$



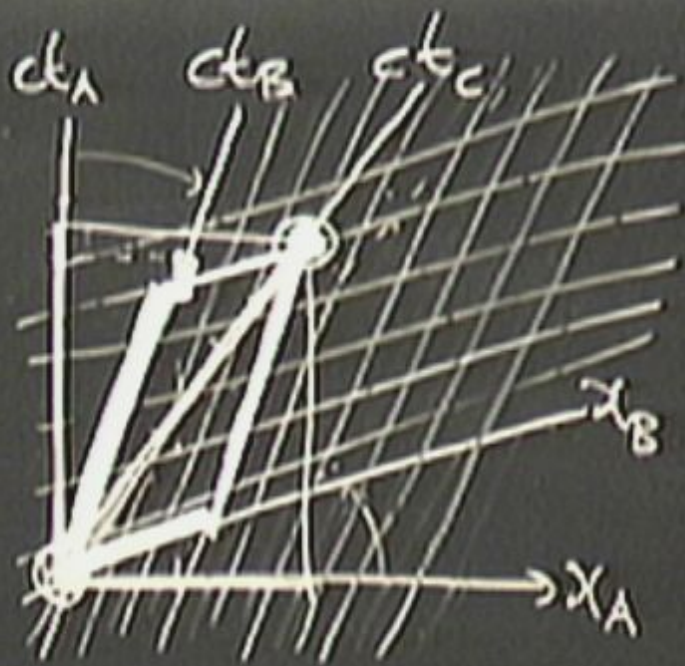


Eucl.





Eucl.

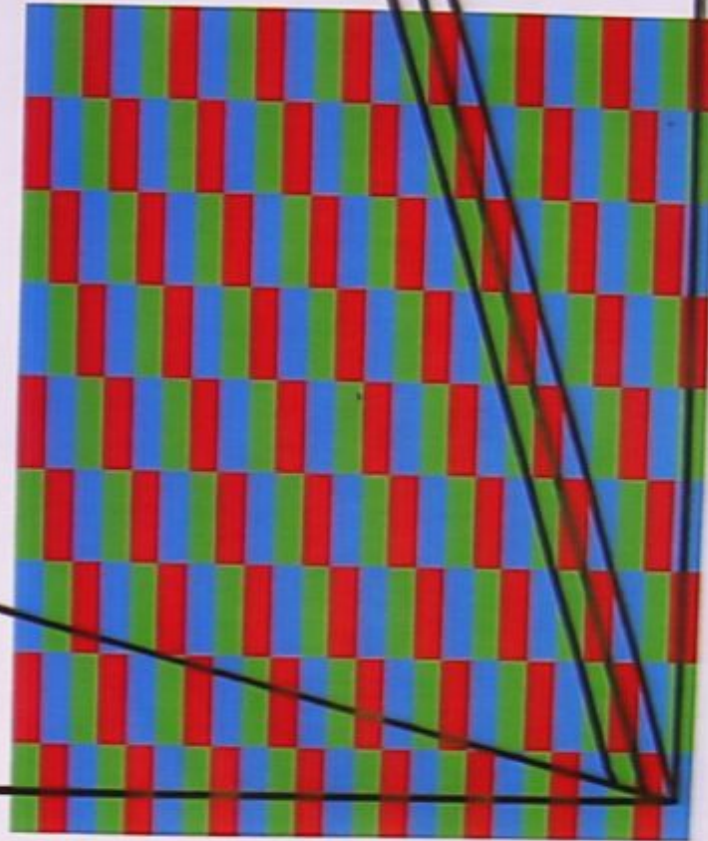


Riemannian  
Geometry



ct<sub>B</sub>

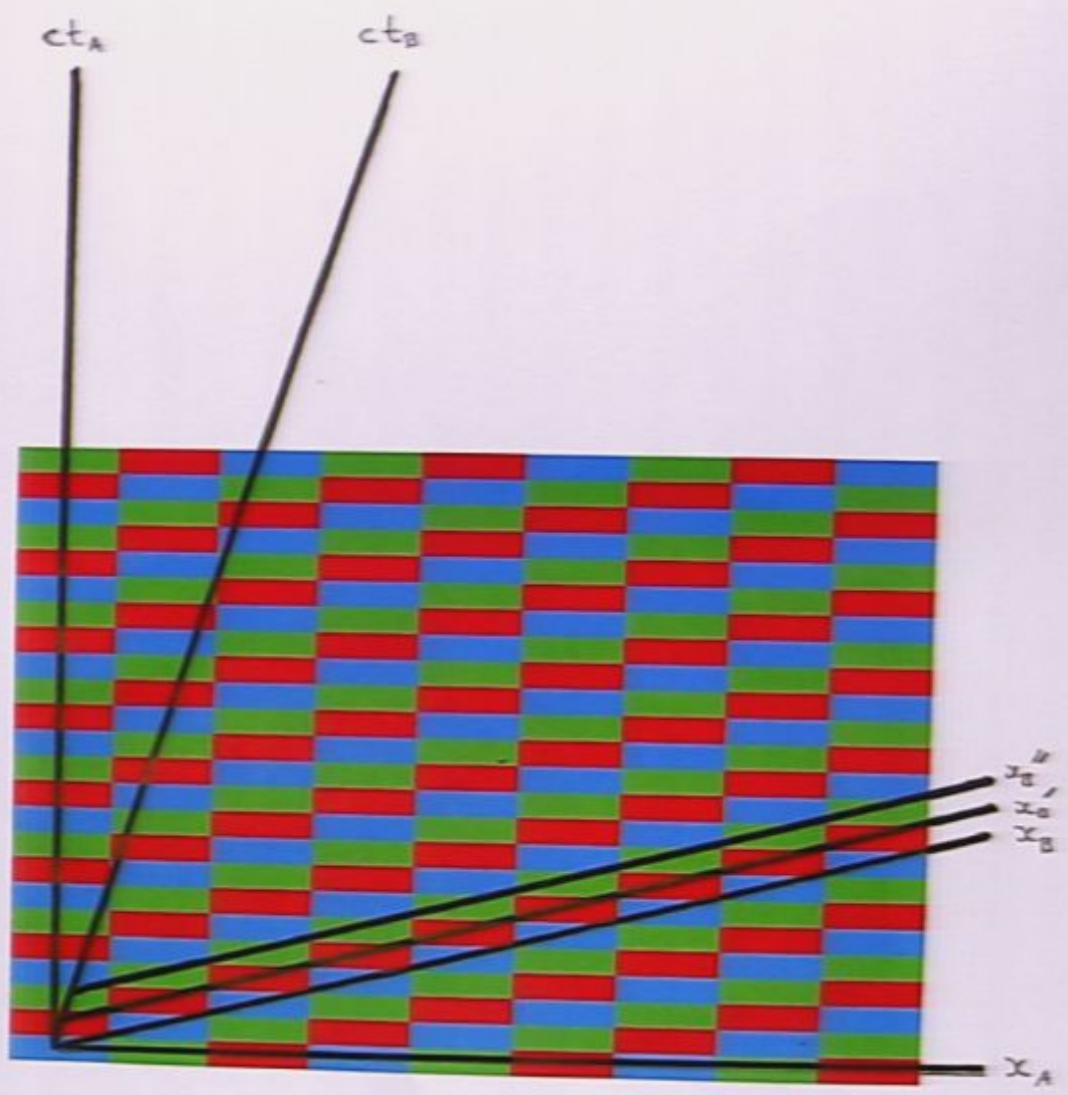
ct<sub>A</sub>



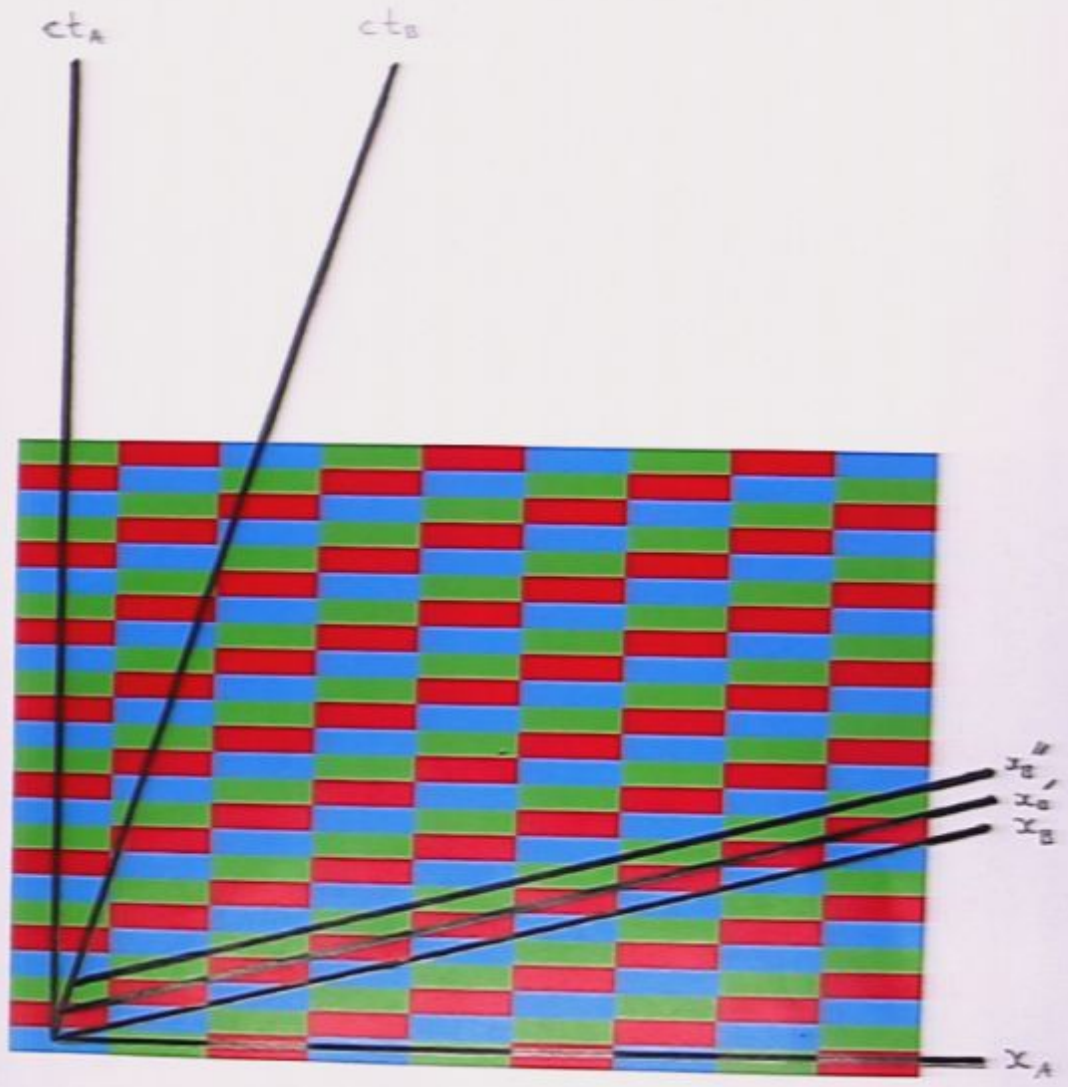
x<sub>B</sub>  
x<sub>A</sub>  
x<sub>B</sub>

x

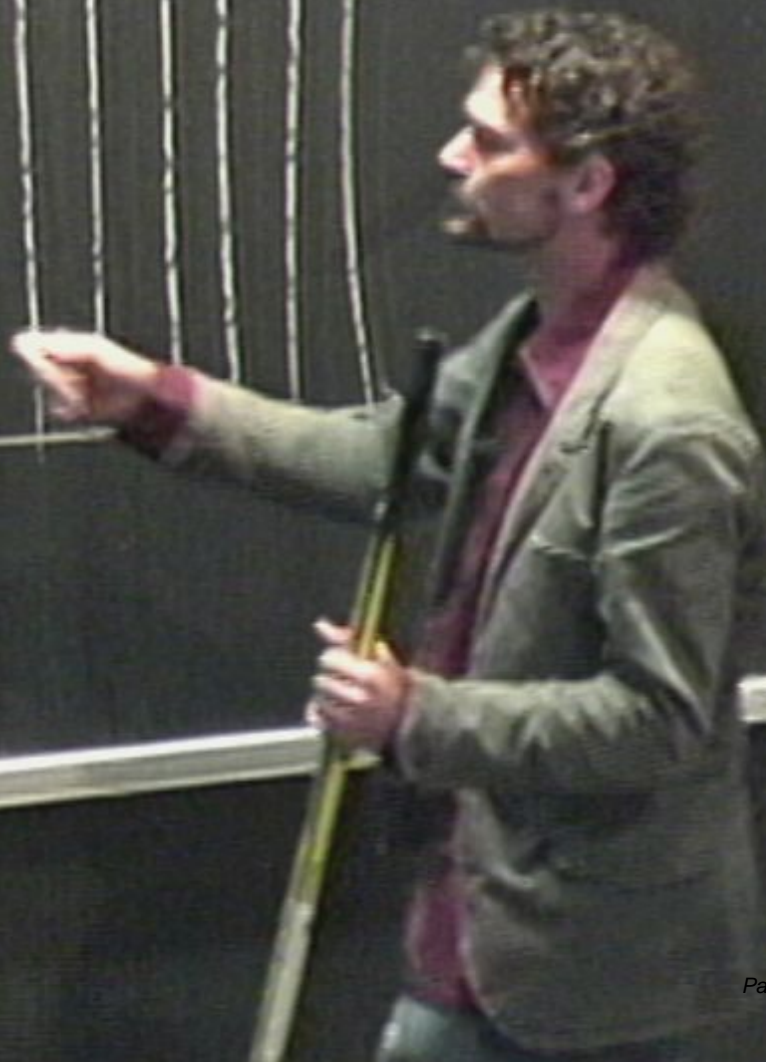
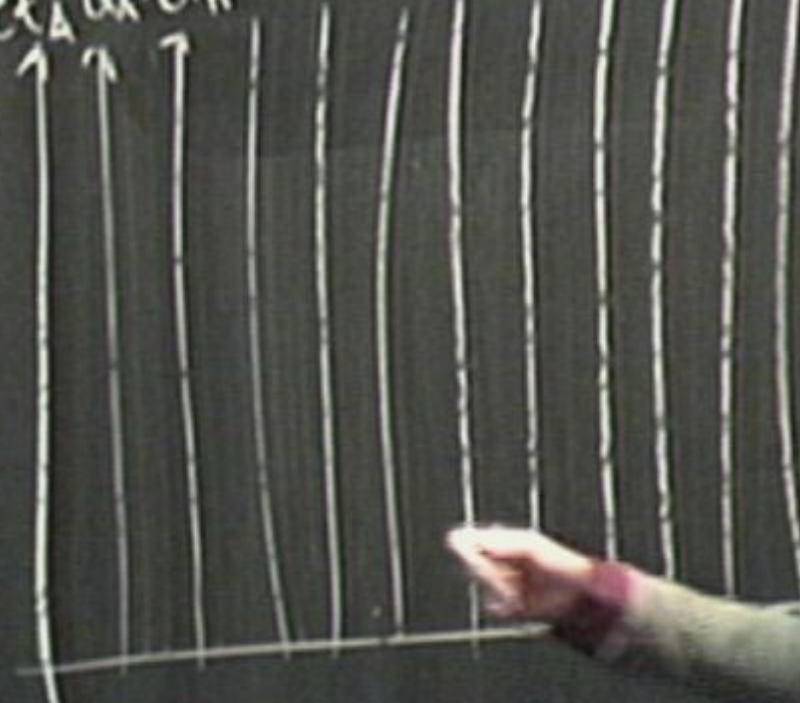
MONITOR OUTPUT  
RED  
PAUSE  
STOP  
WHITE

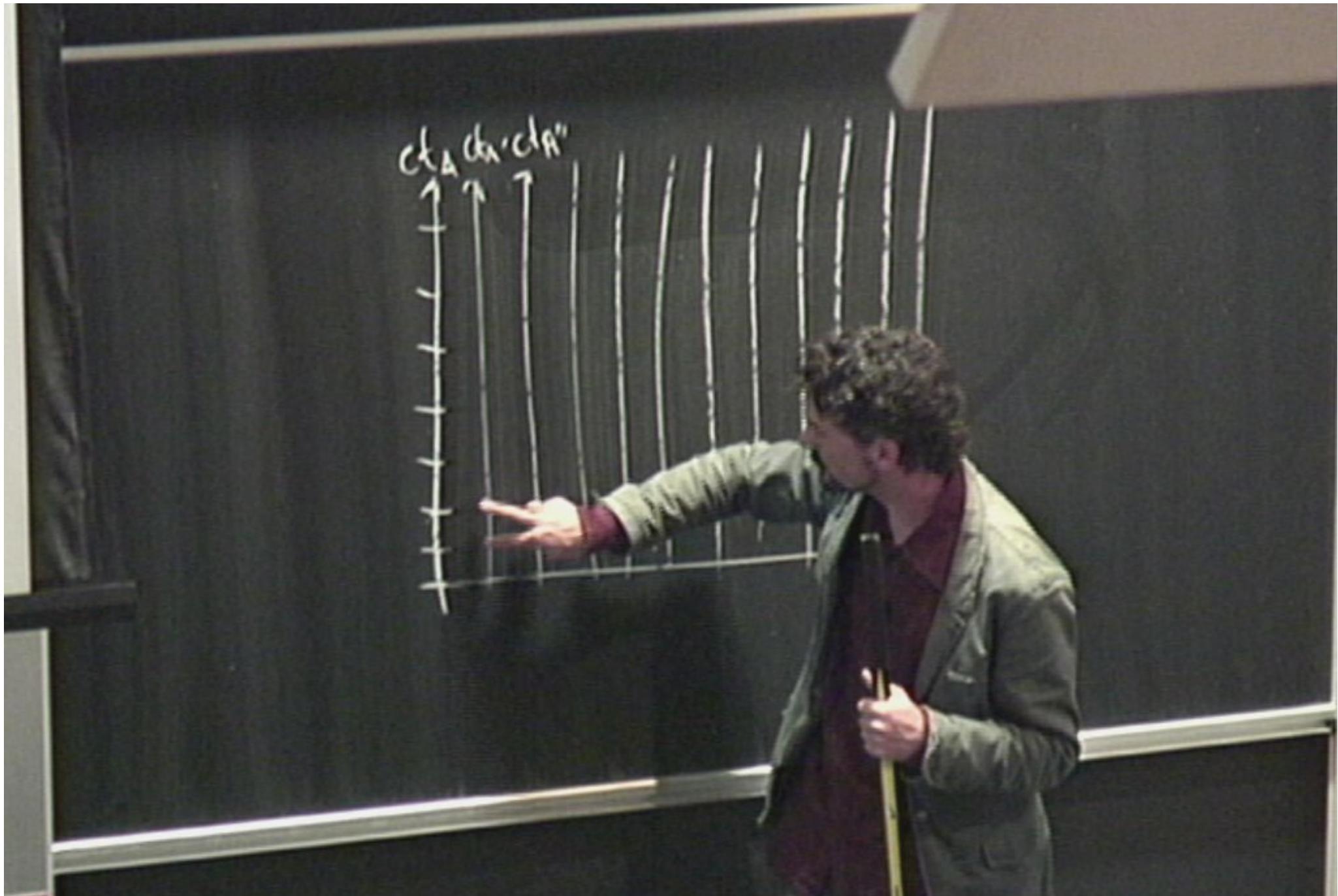


MONITOR OUTPUT  
RED  
PAPER  
GREEN  
WHITE



ct<sub>A</sub> ch<sub>A</sub> ct<sub>A</sub>"

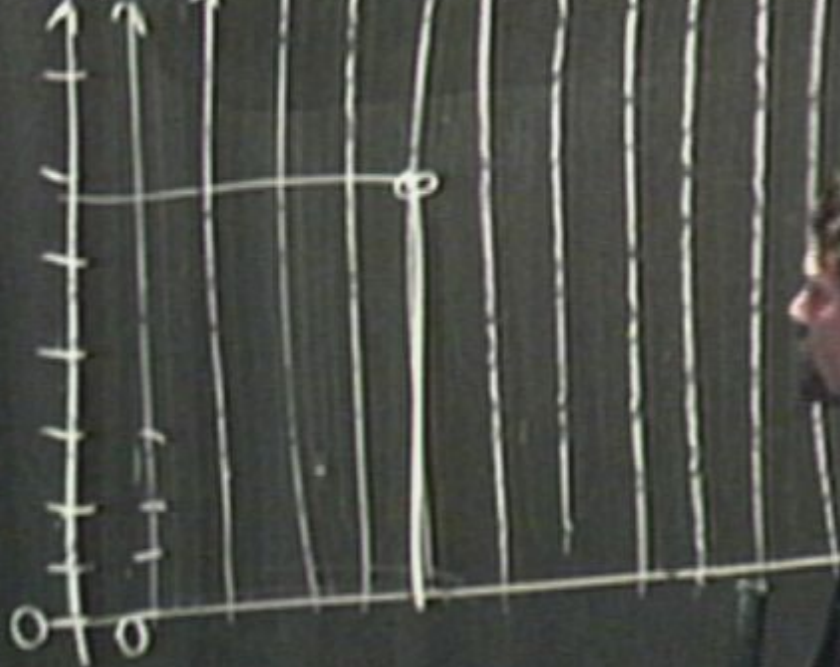


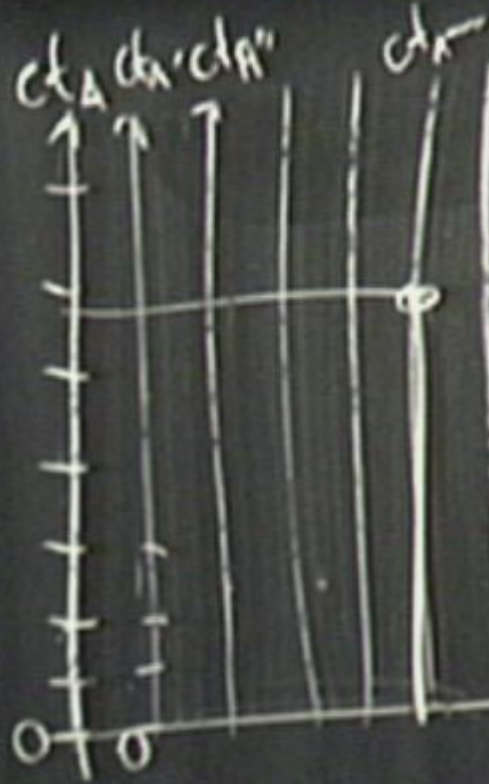


character



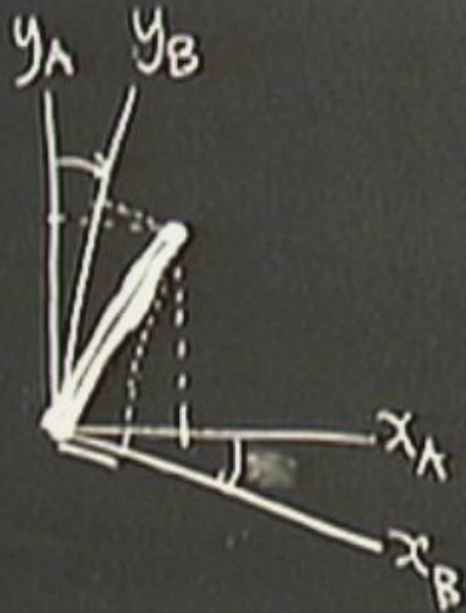
character



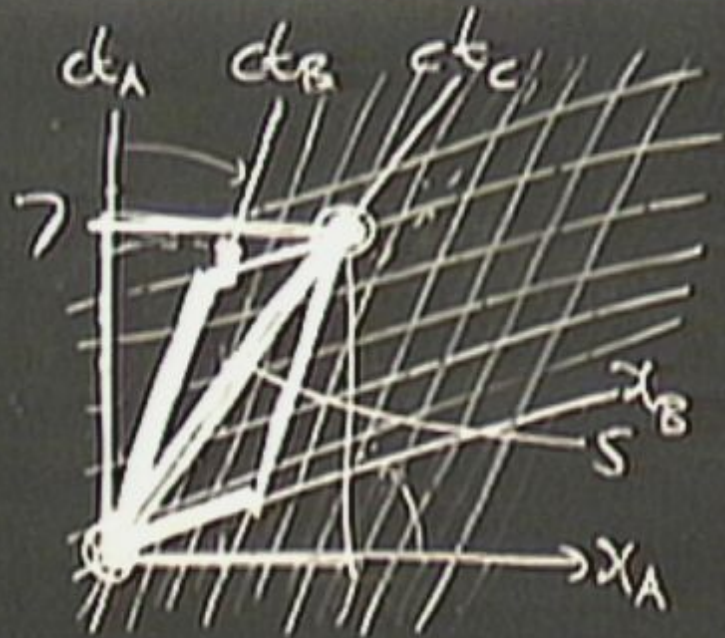


# Length Contraction



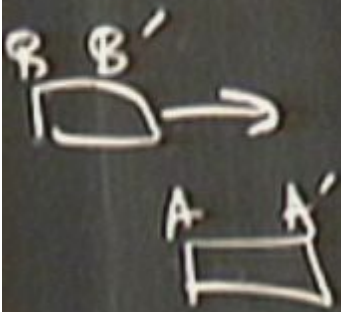


Eucl.

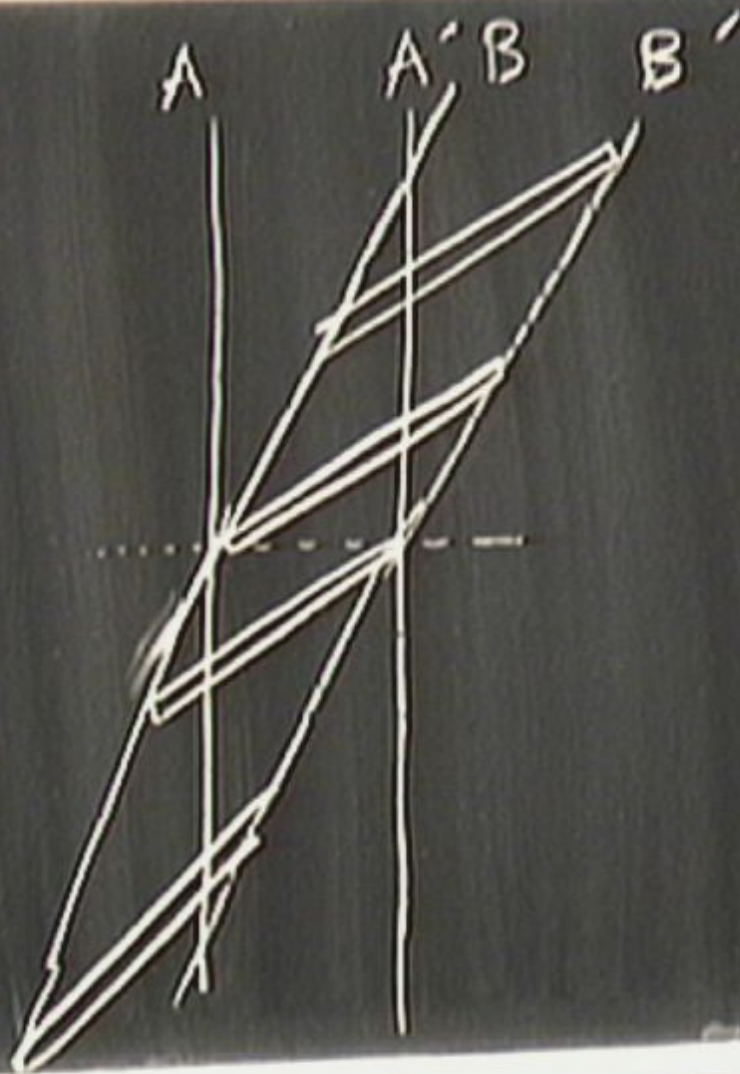
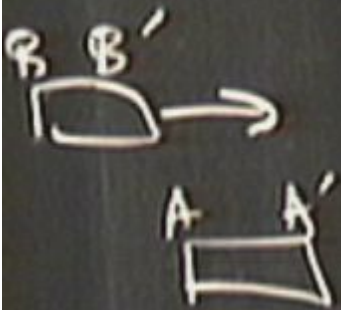


Geometry

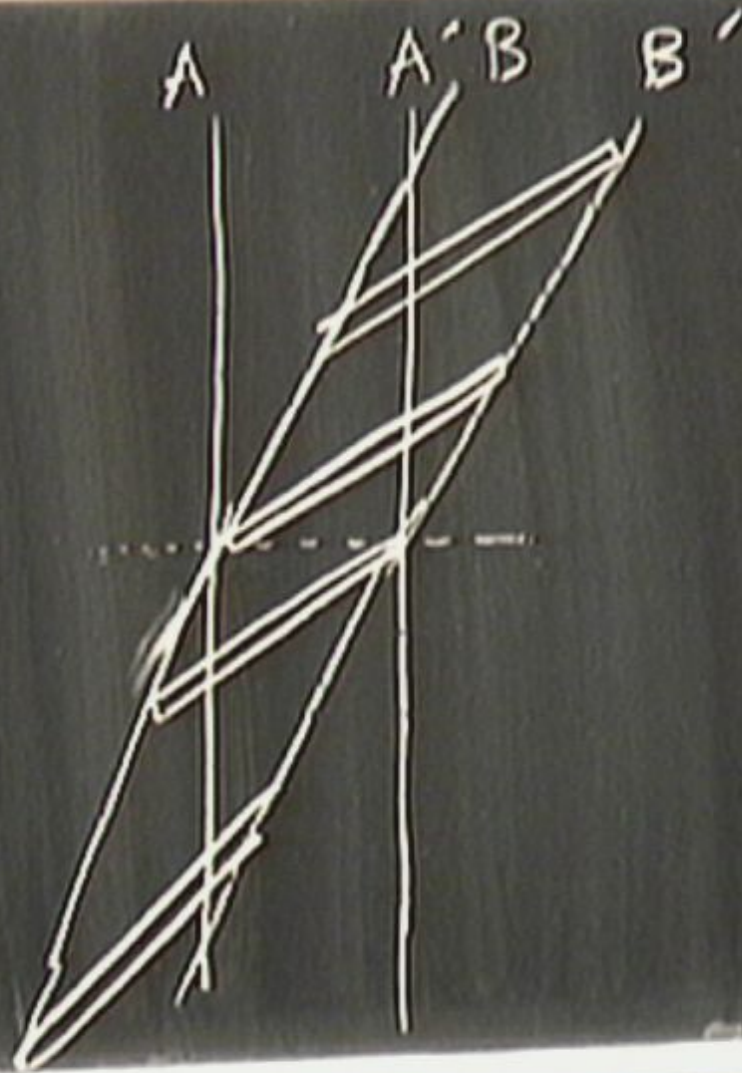
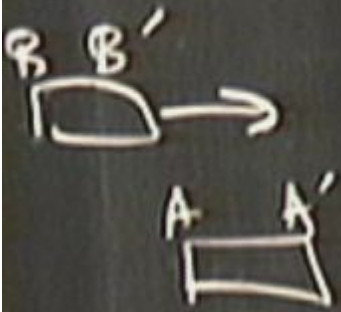
# Length Contraction



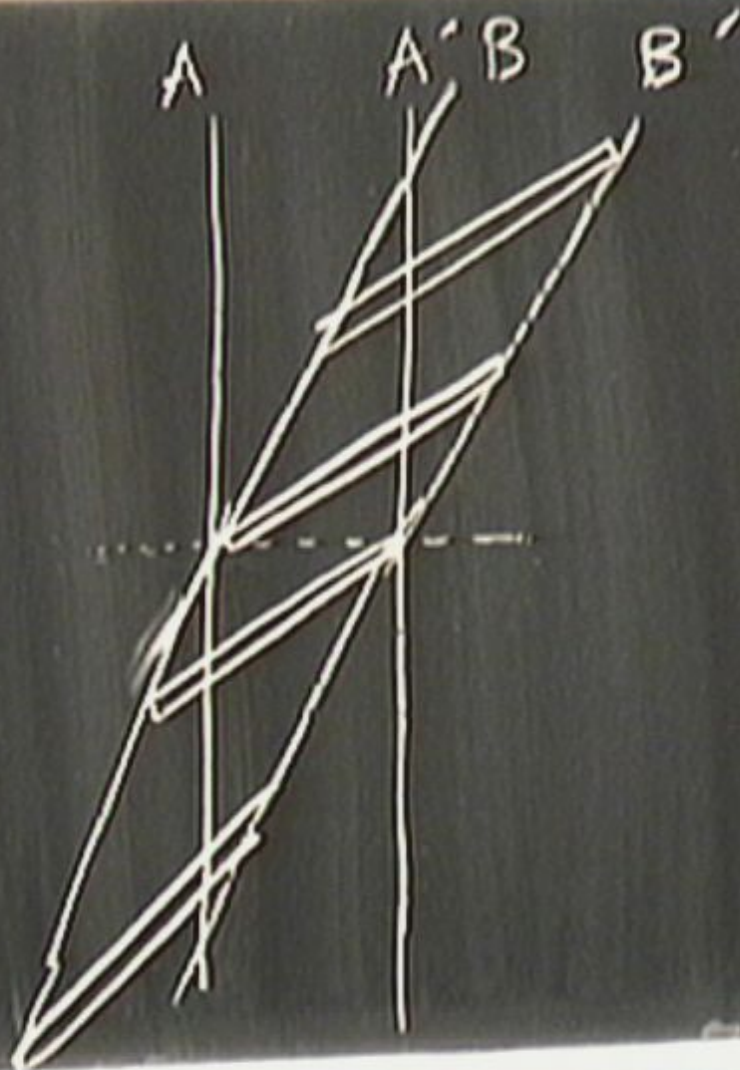
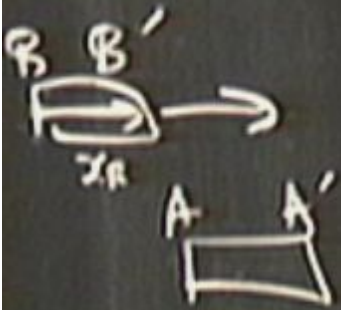
# Length Contraction



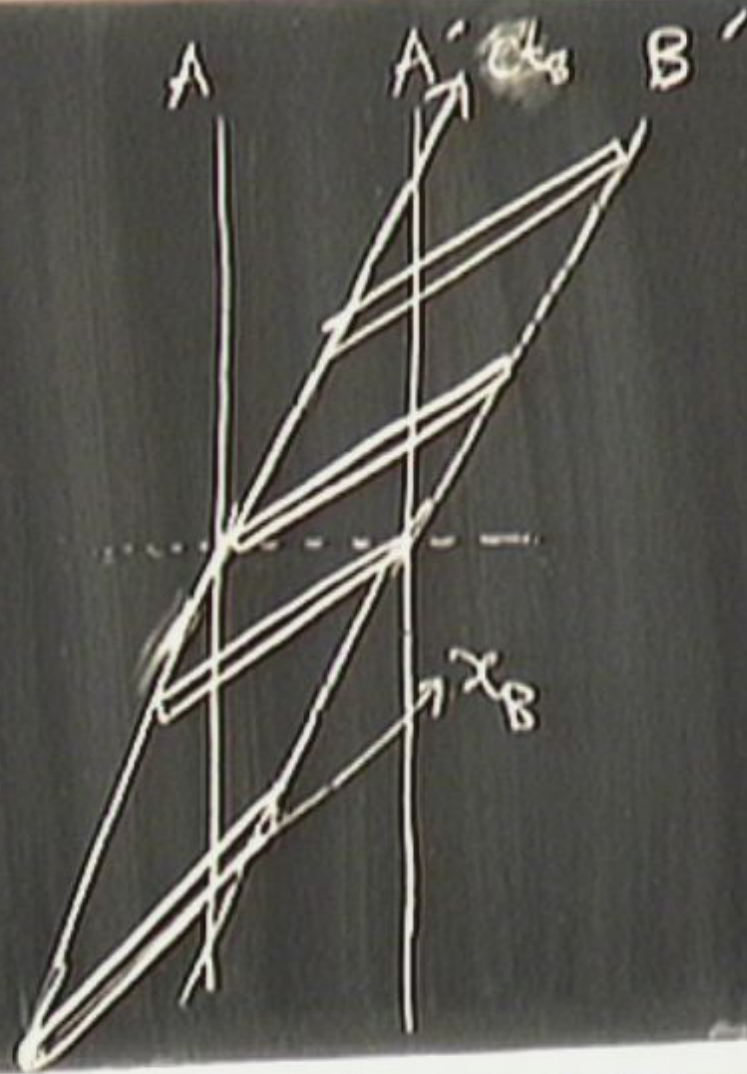
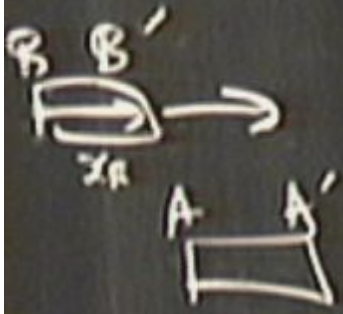
# Length Contraction



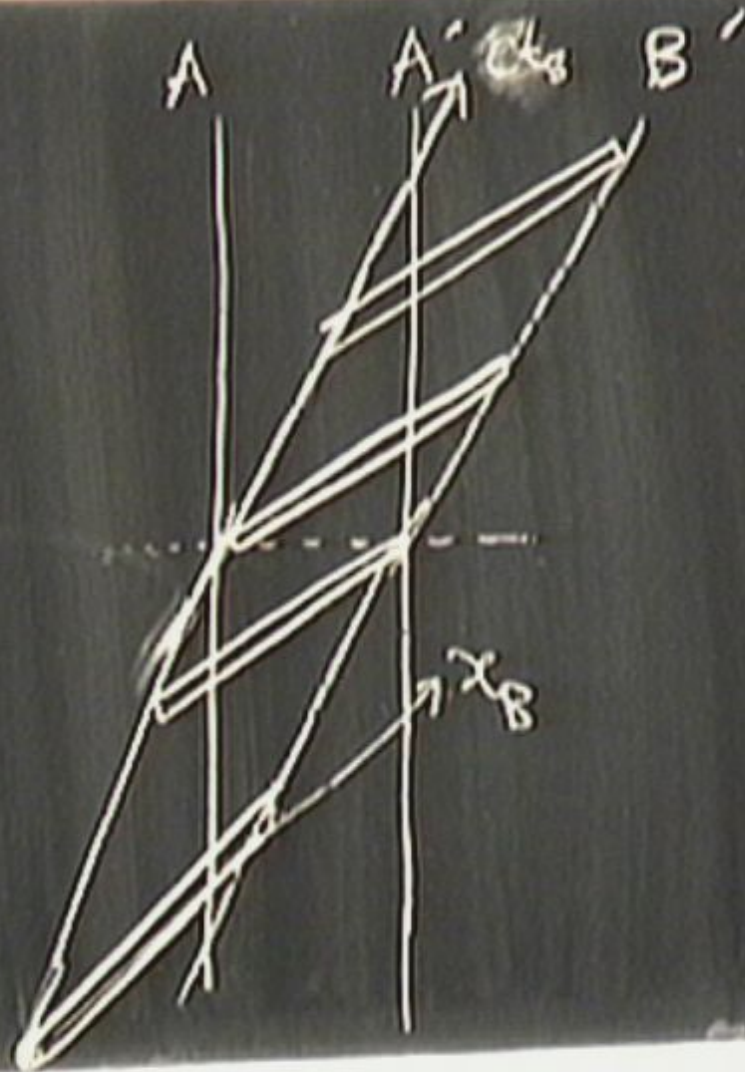
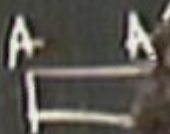
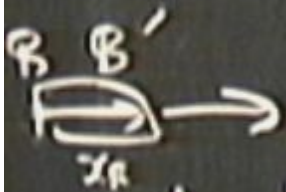
# Length Contraction



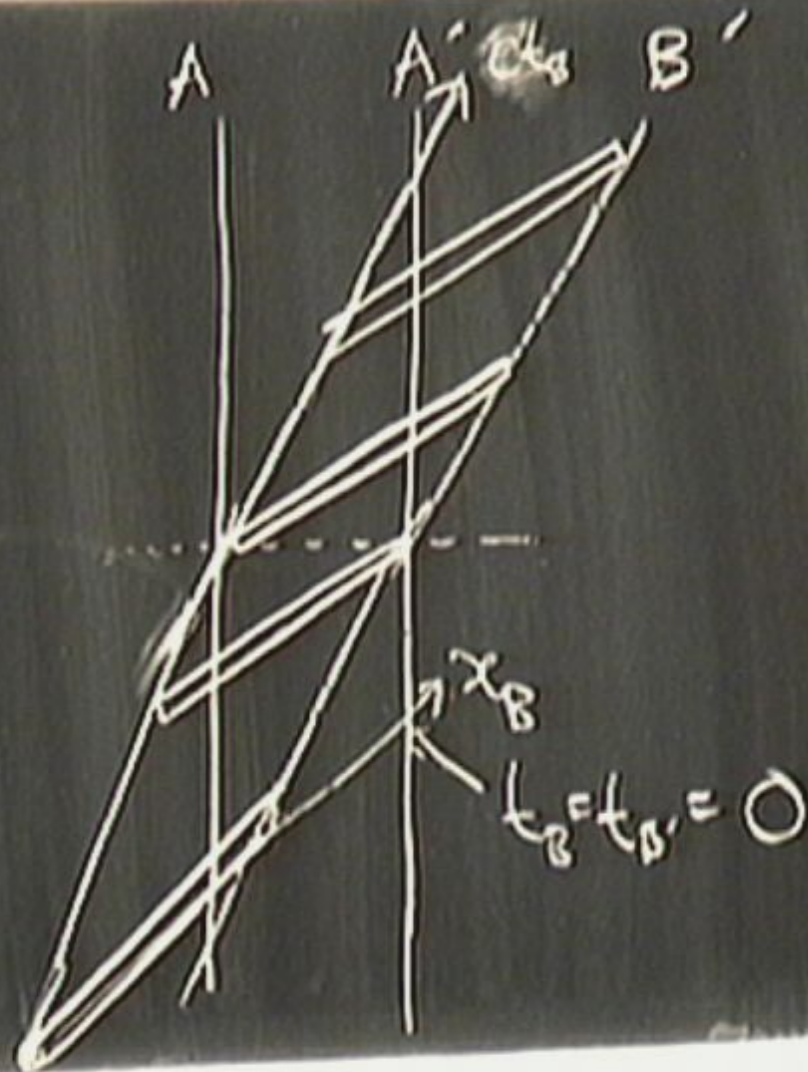
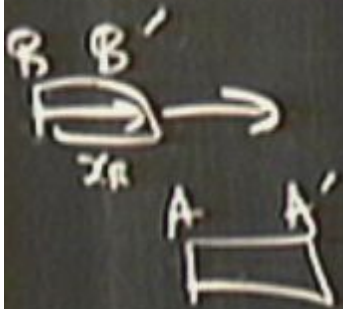
# Length Contraction



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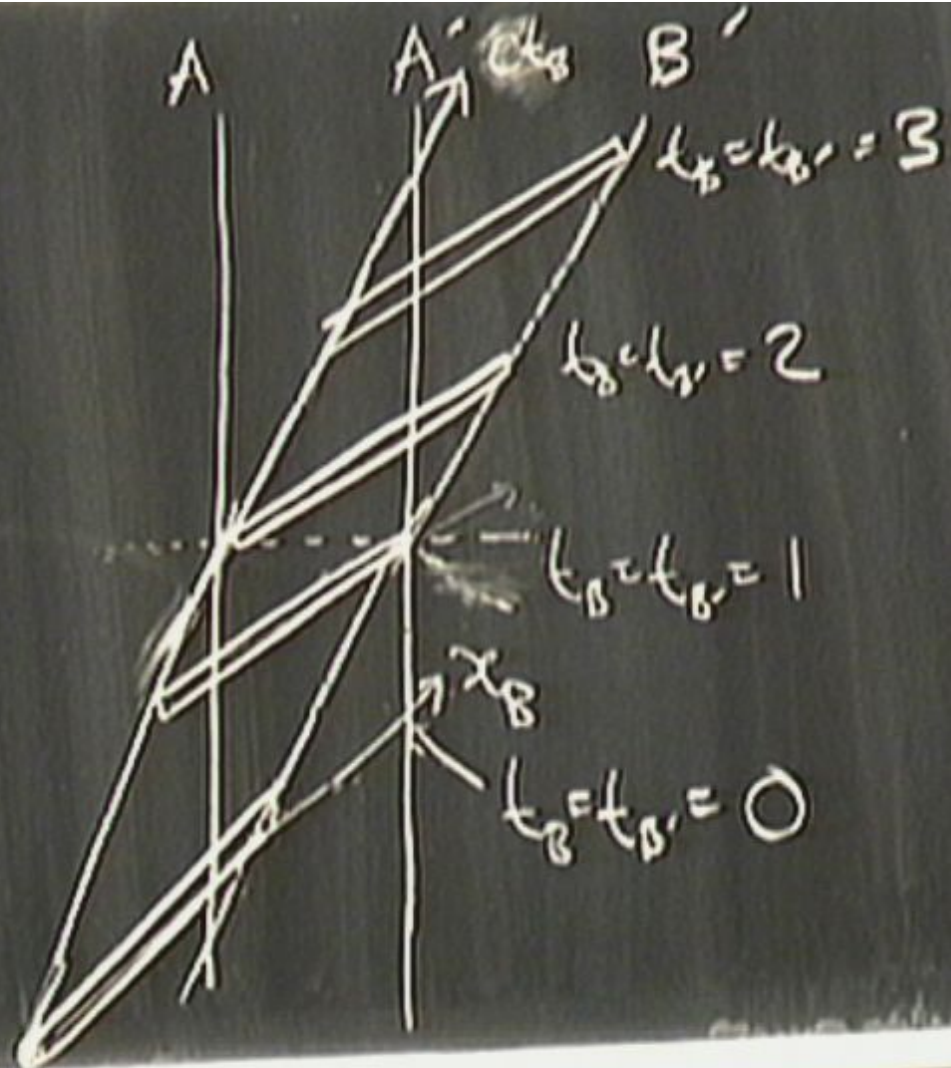
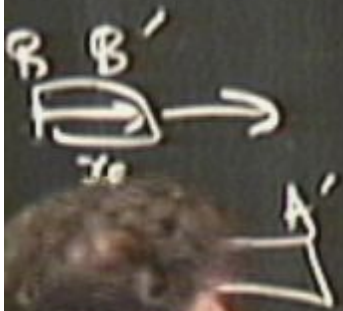


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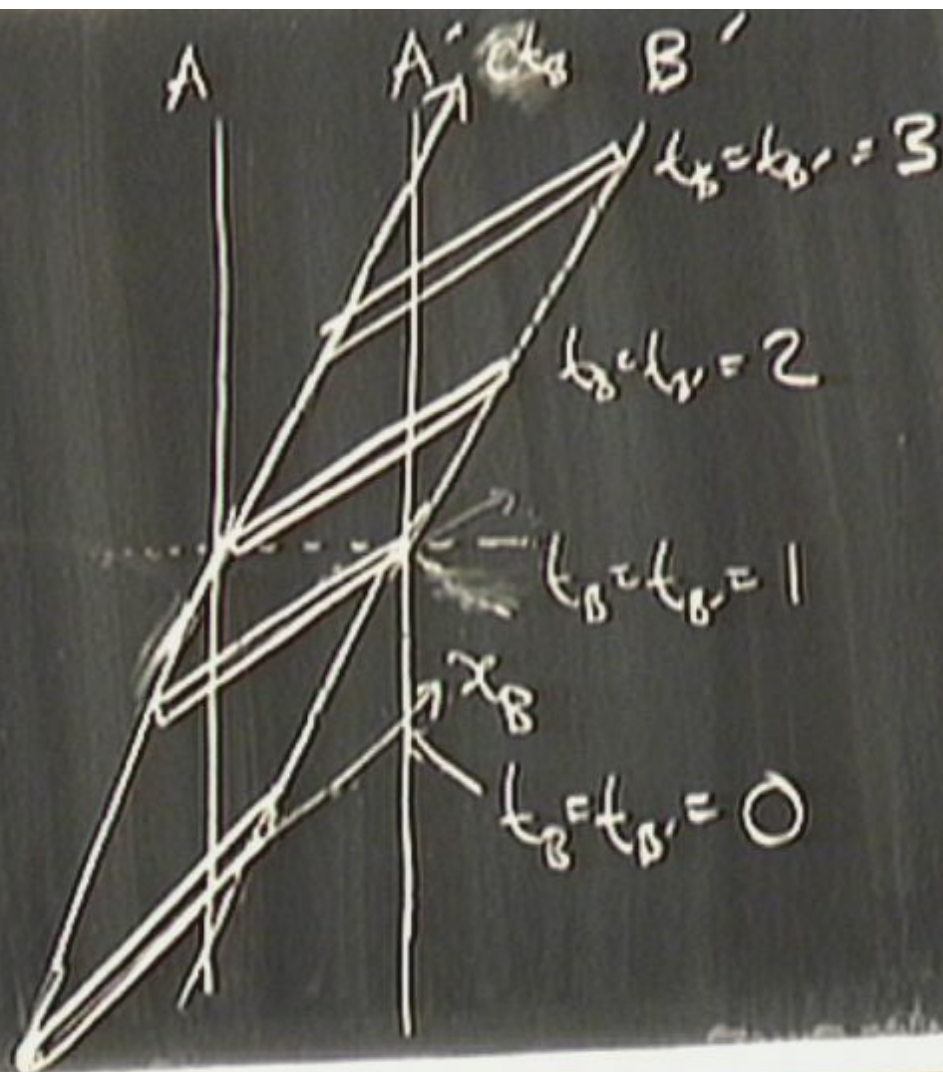
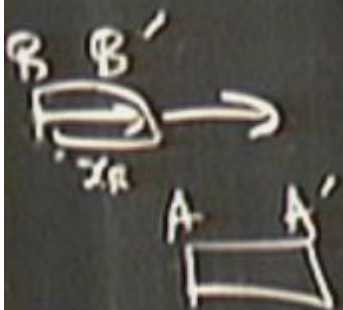




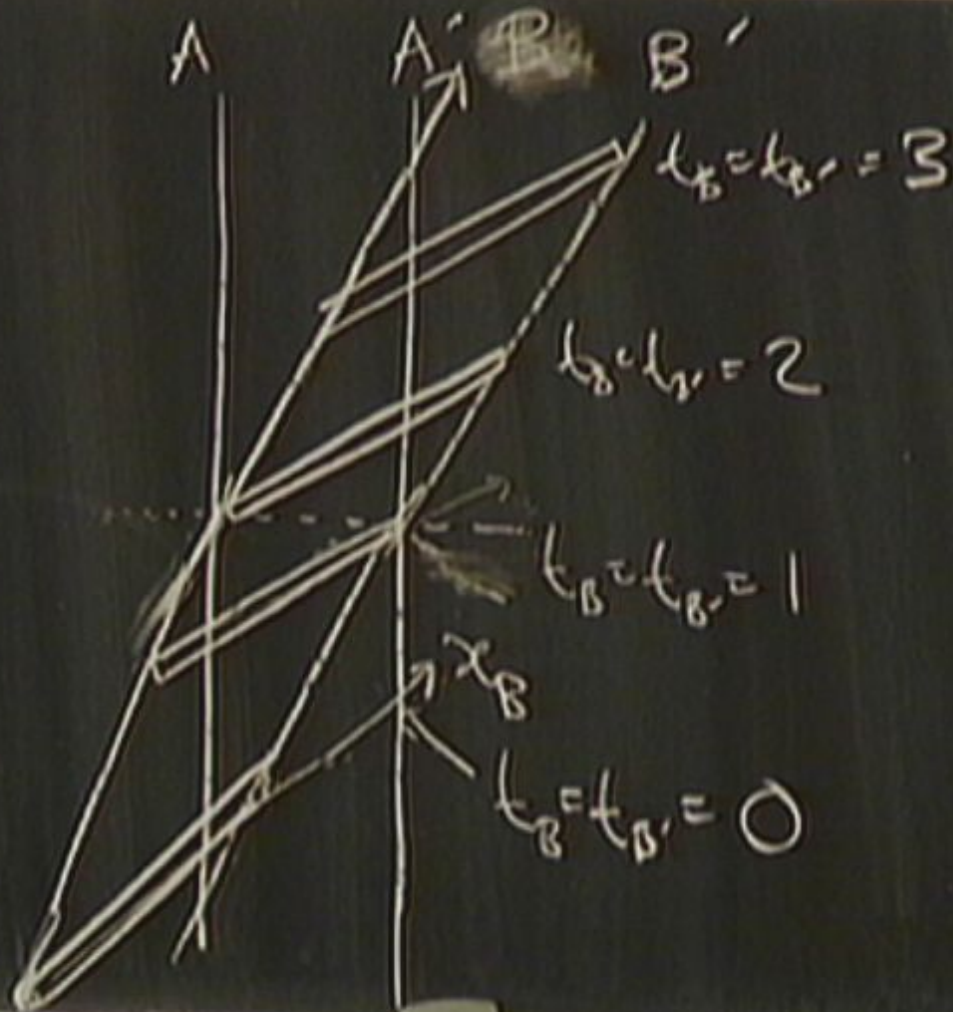
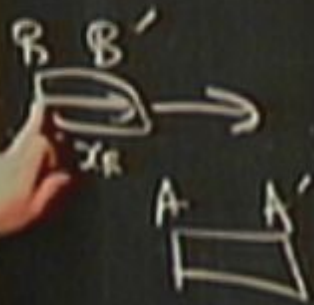
# Length Contraction



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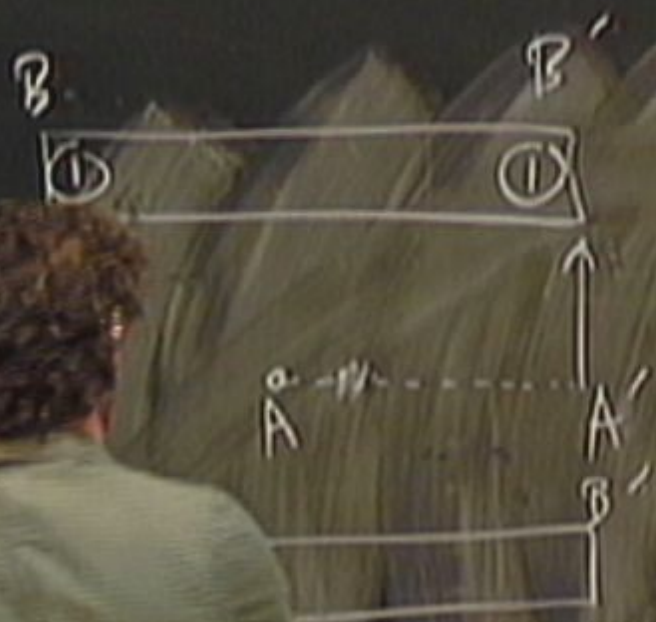
# Length Contraction



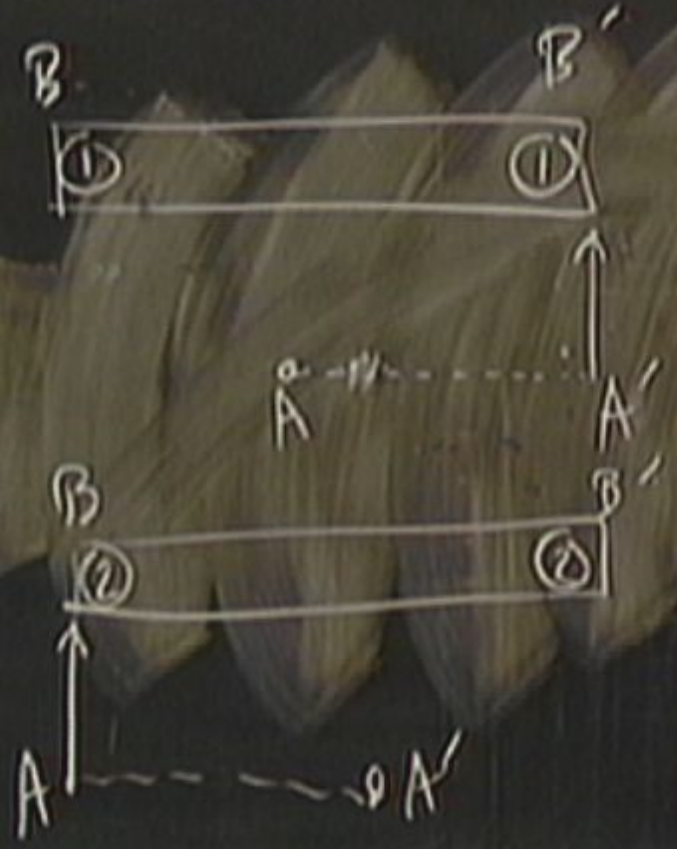
BB' see:



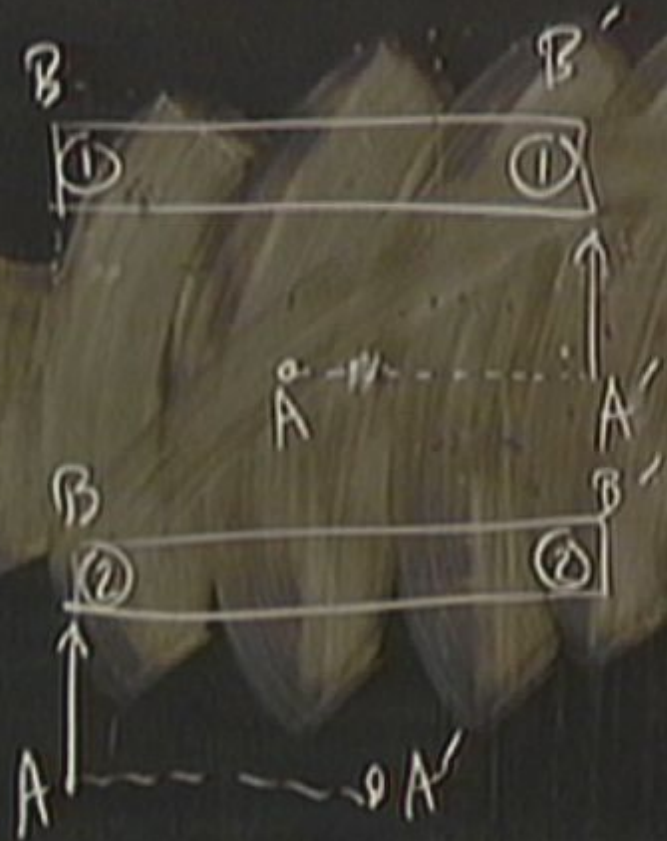
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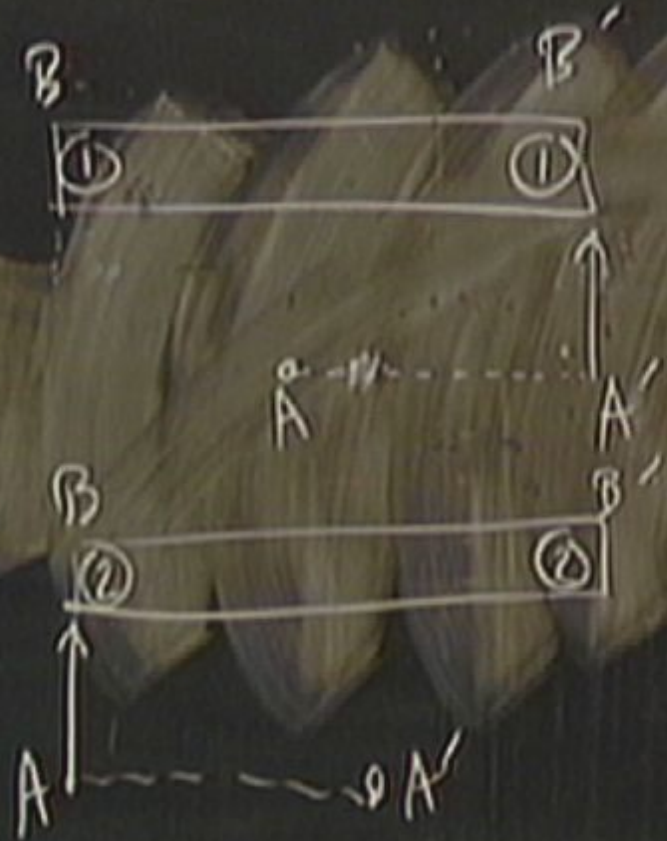
BB' see:



BB' see:

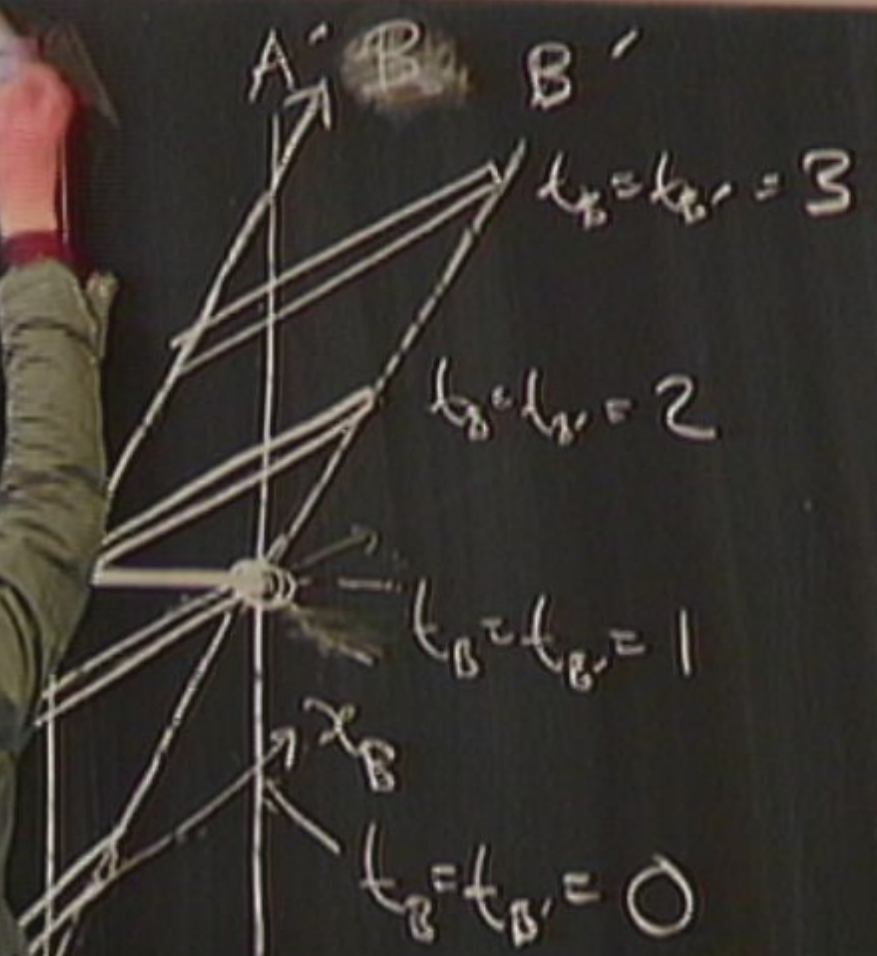
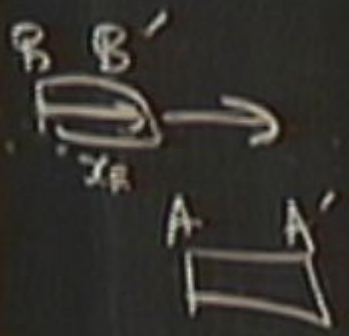


BB' see :

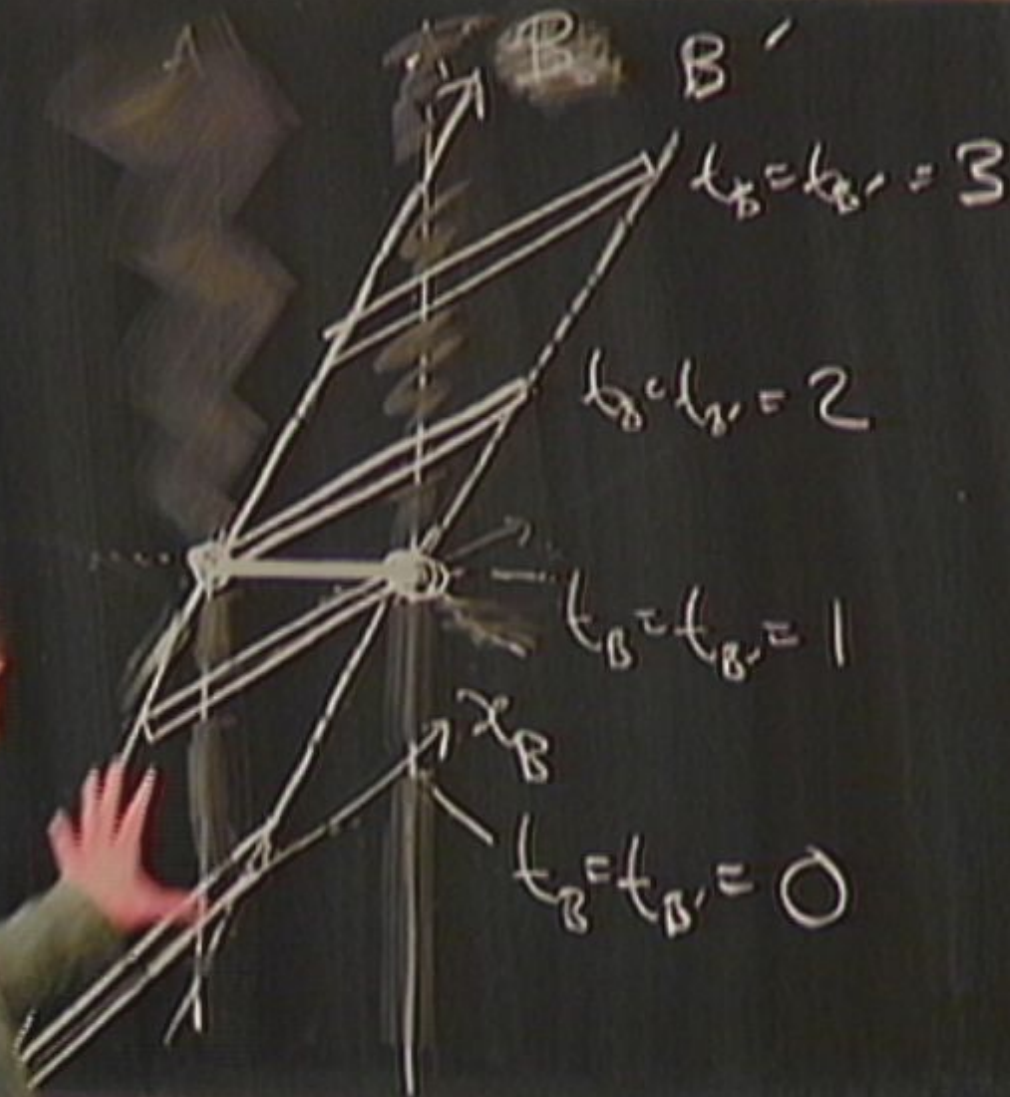
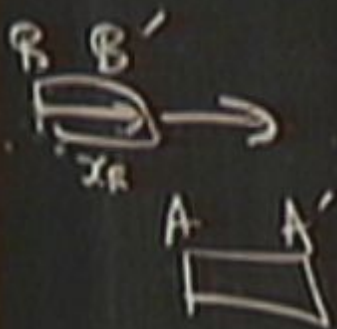




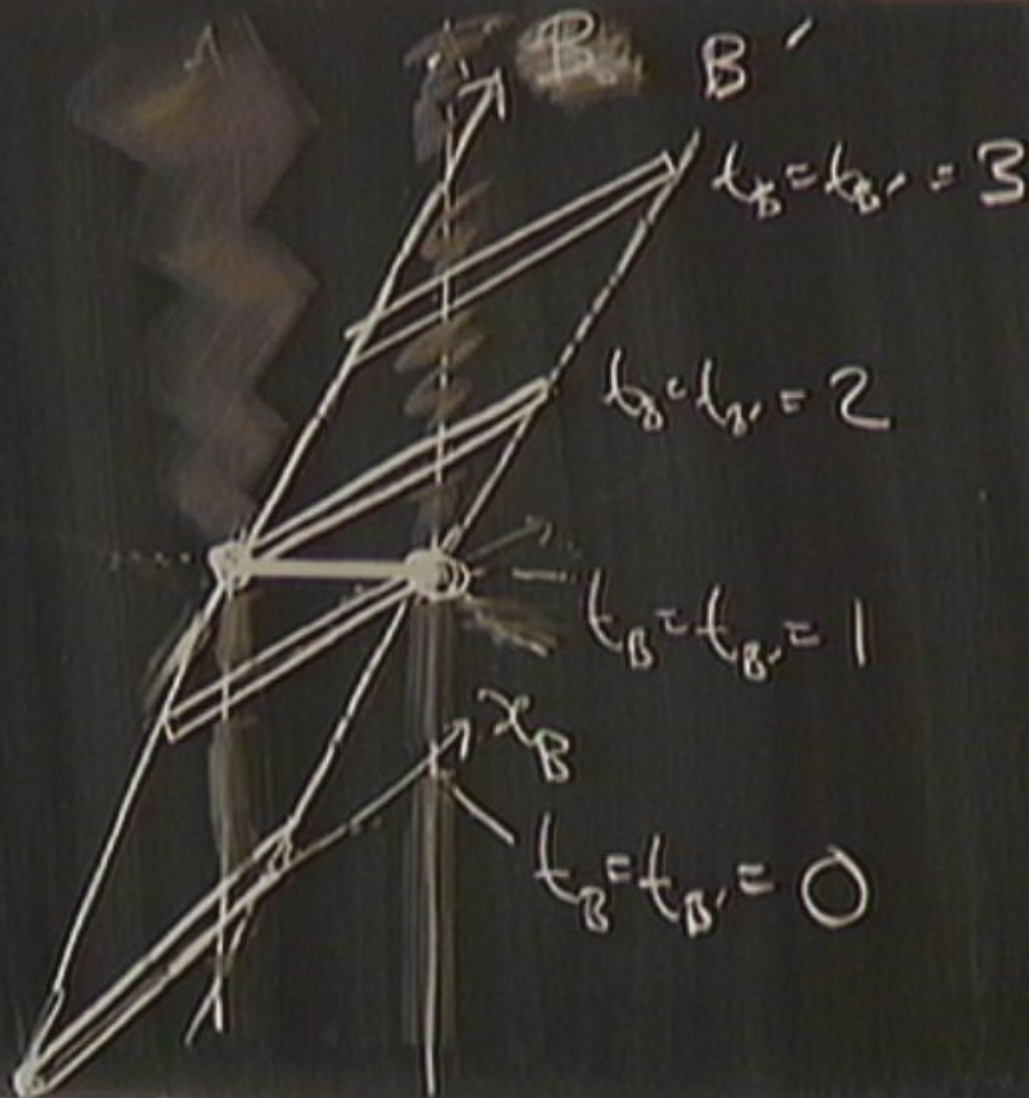
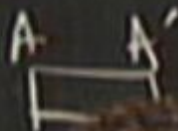
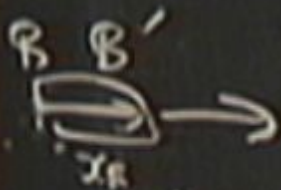
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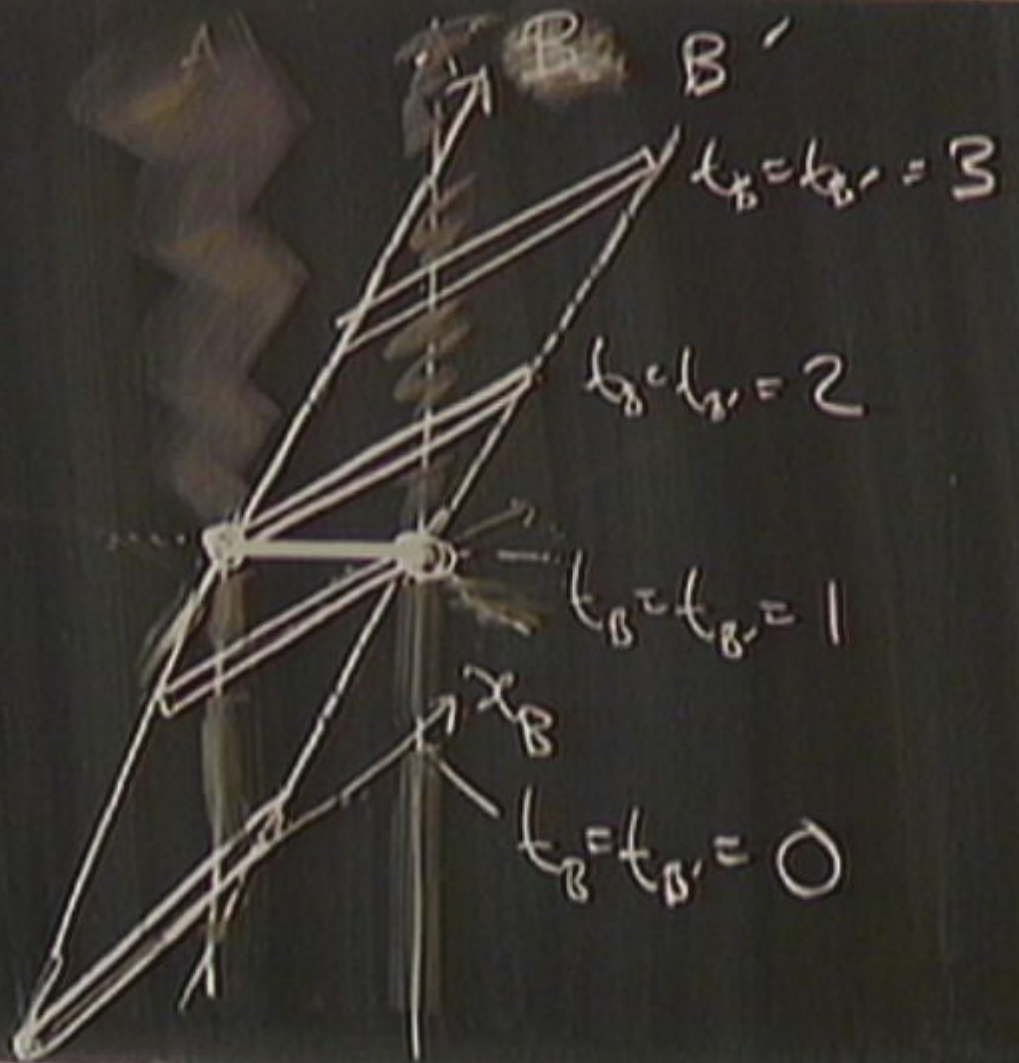
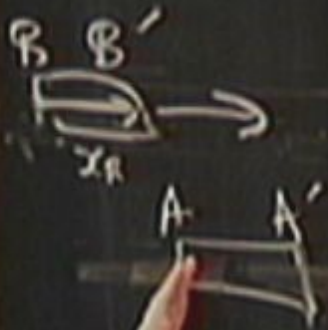
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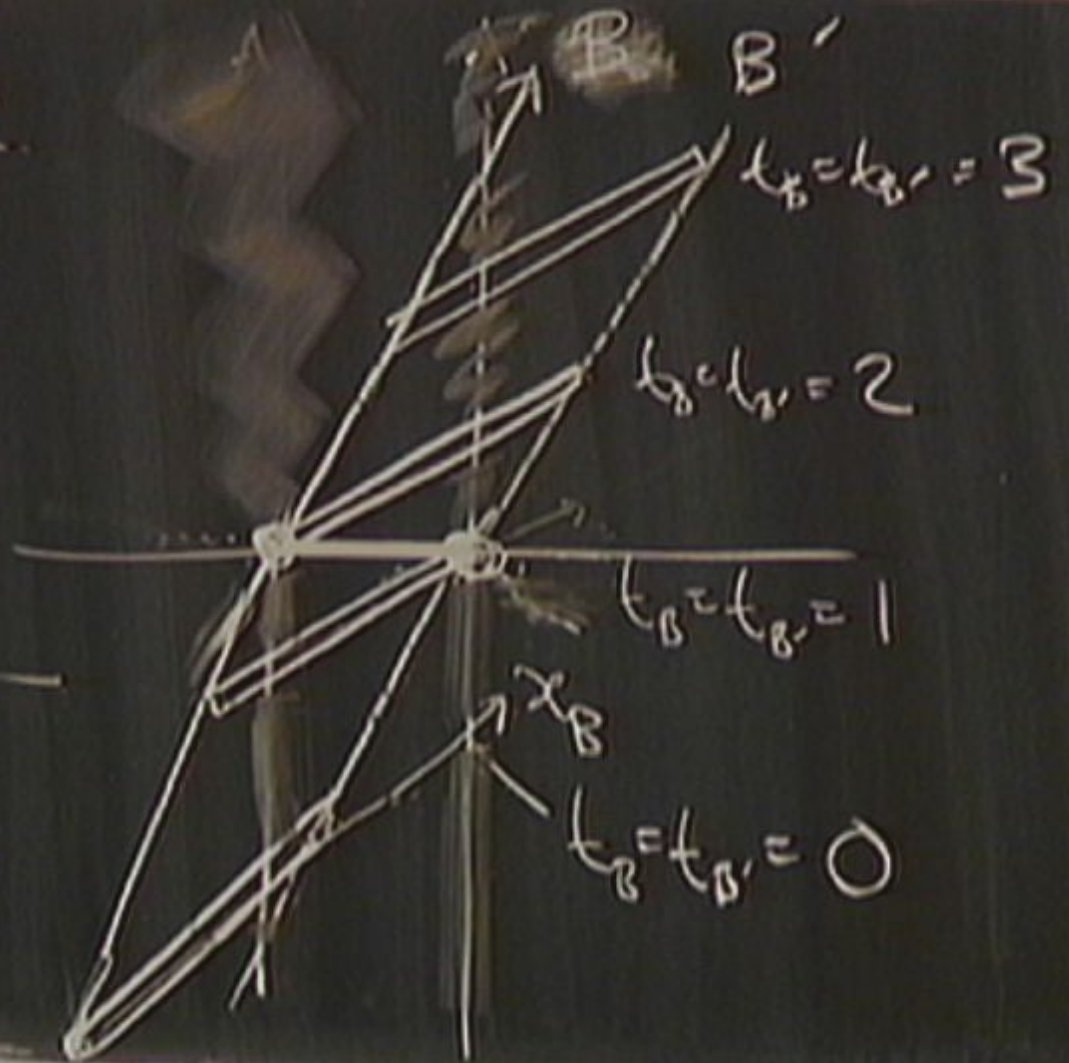
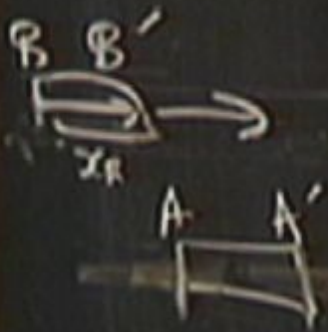
# Length Contraction



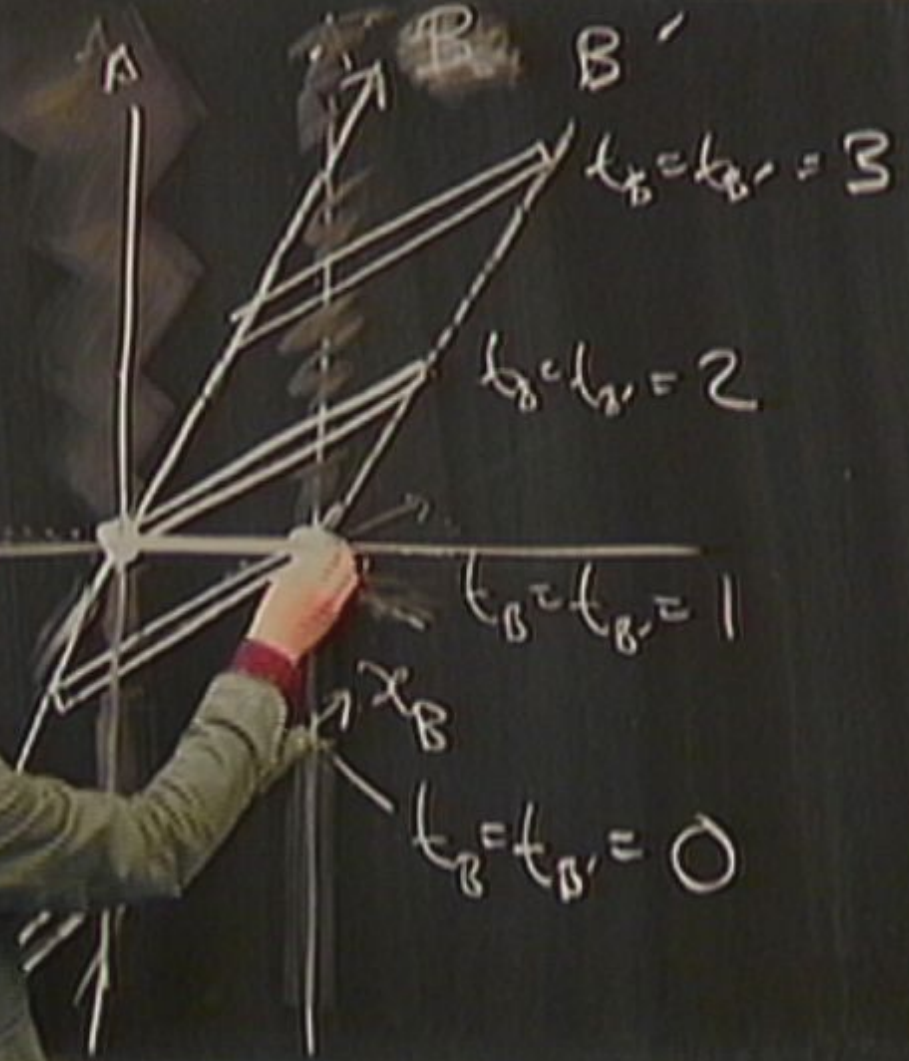
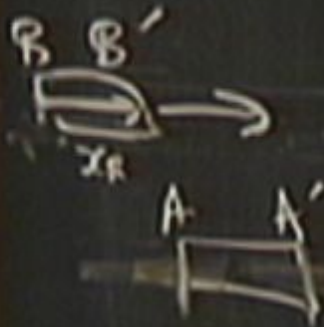
# Length Contraction



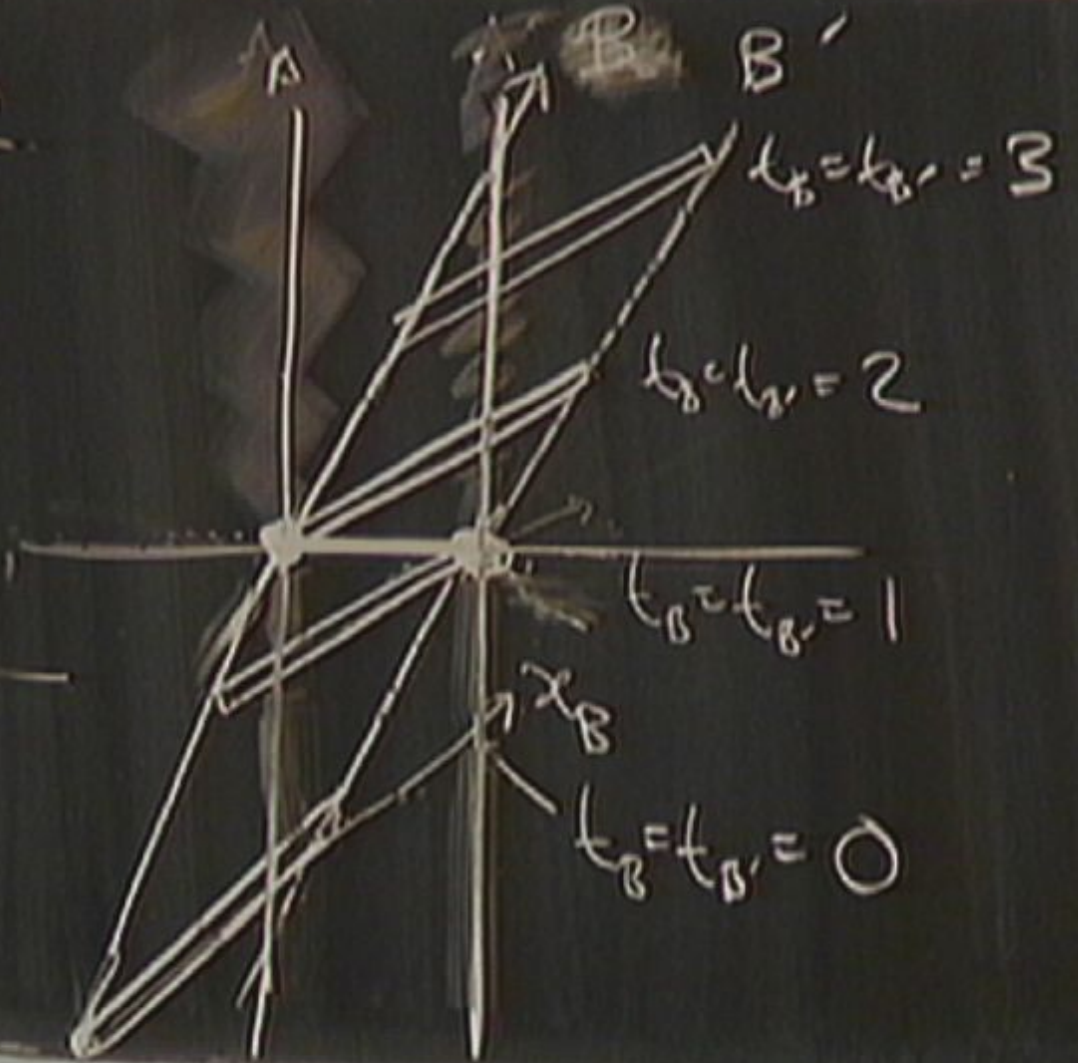
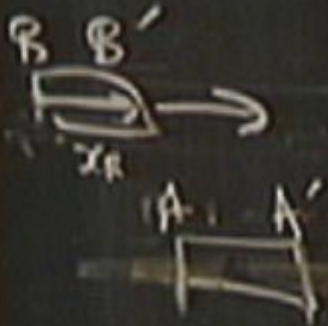
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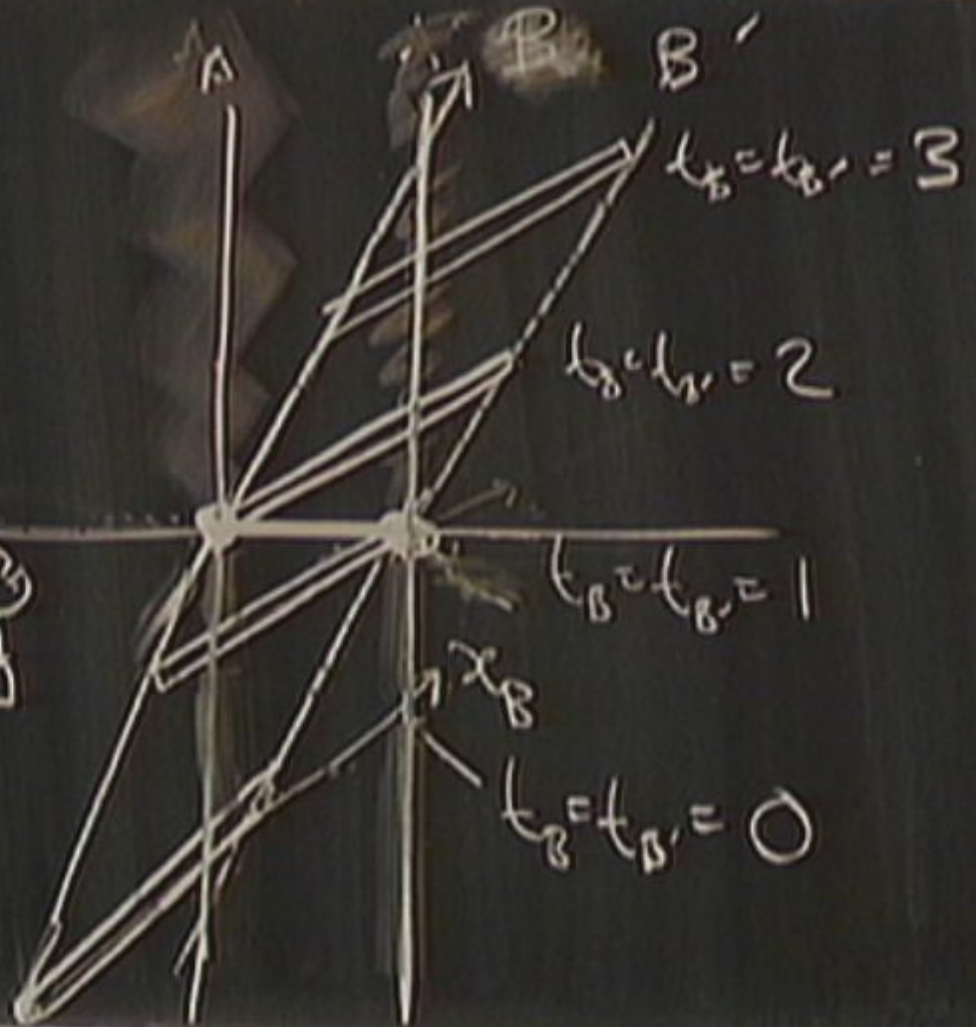
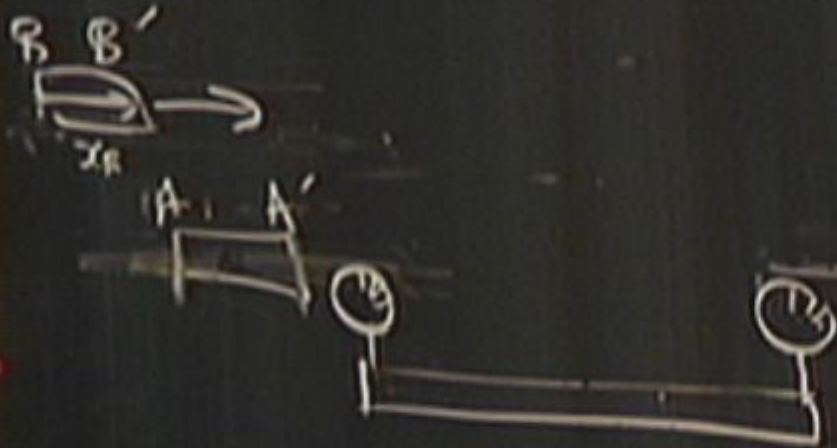
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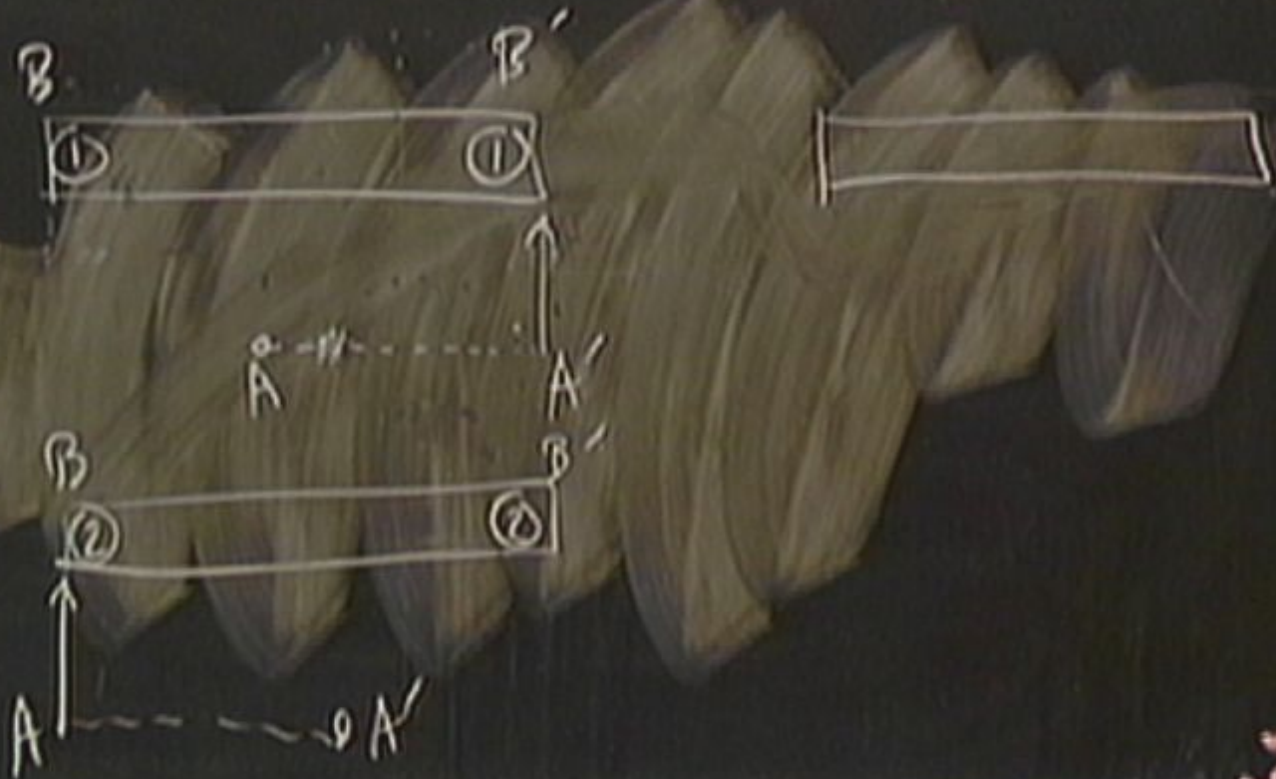


# Length Contraction

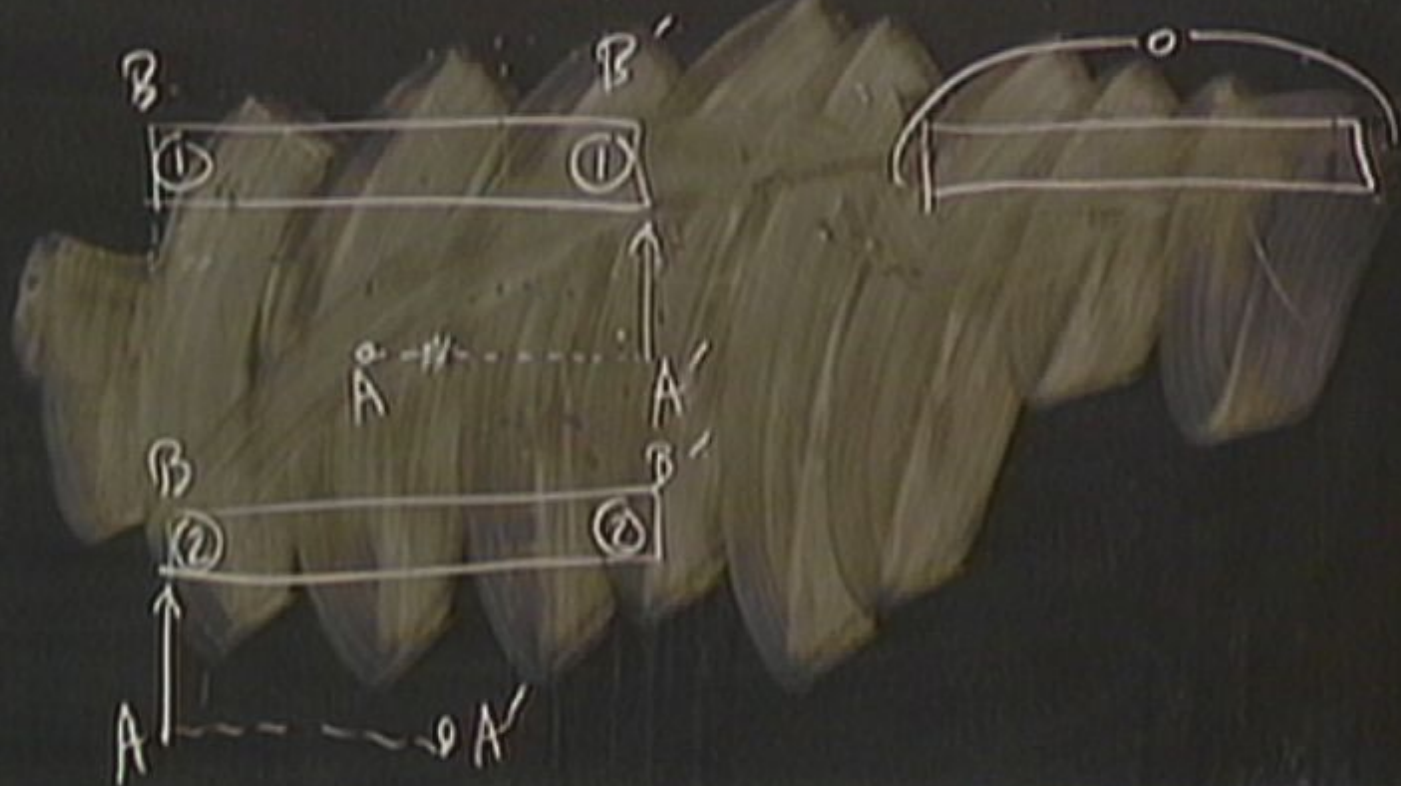




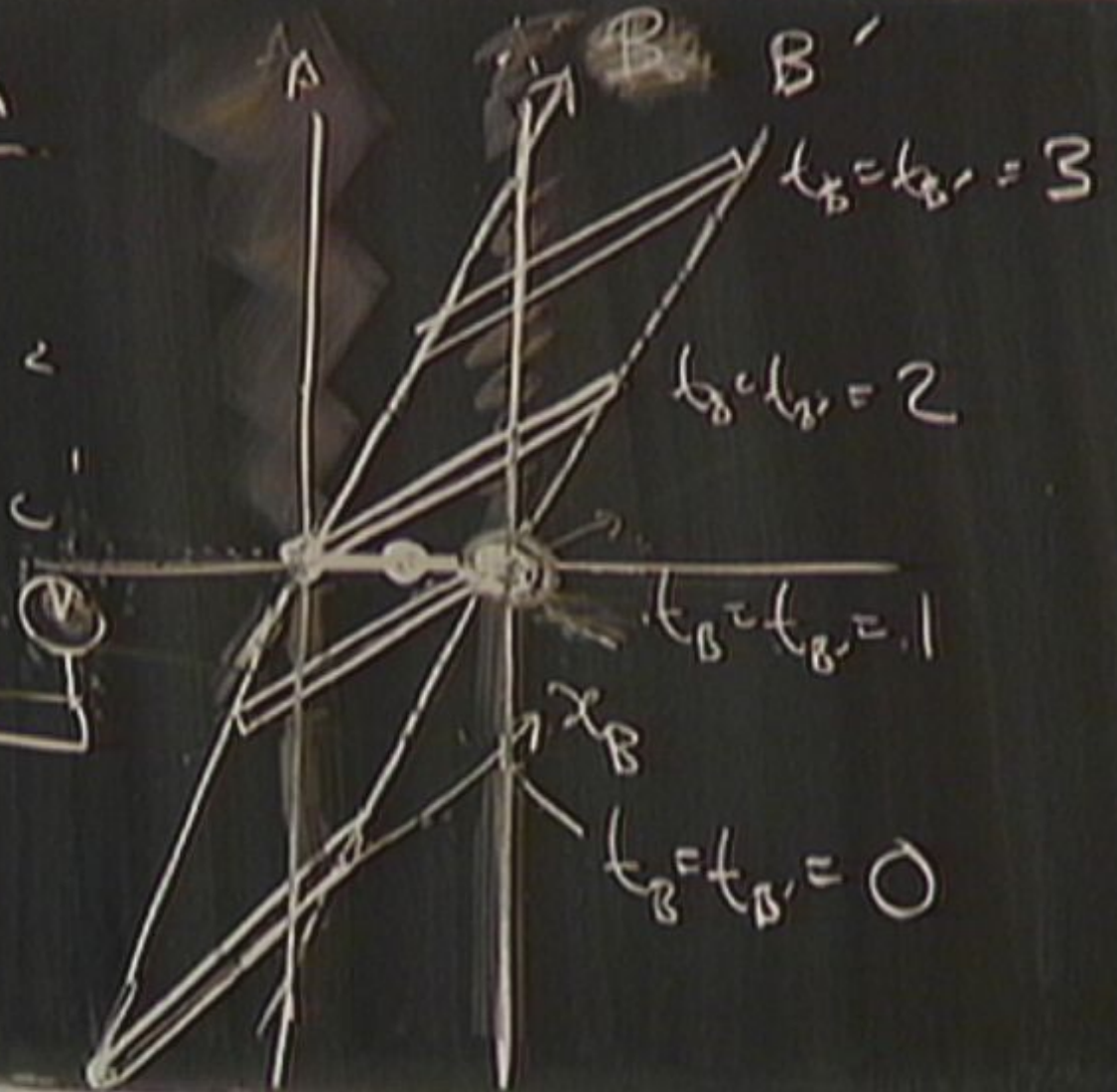
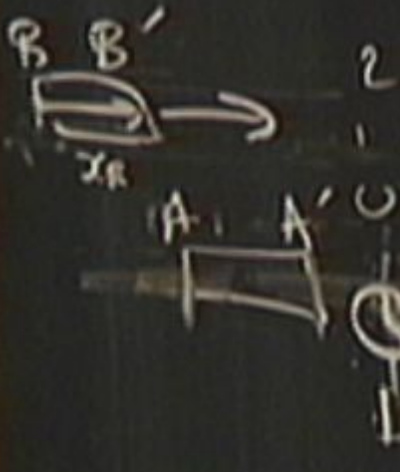
BB' see:



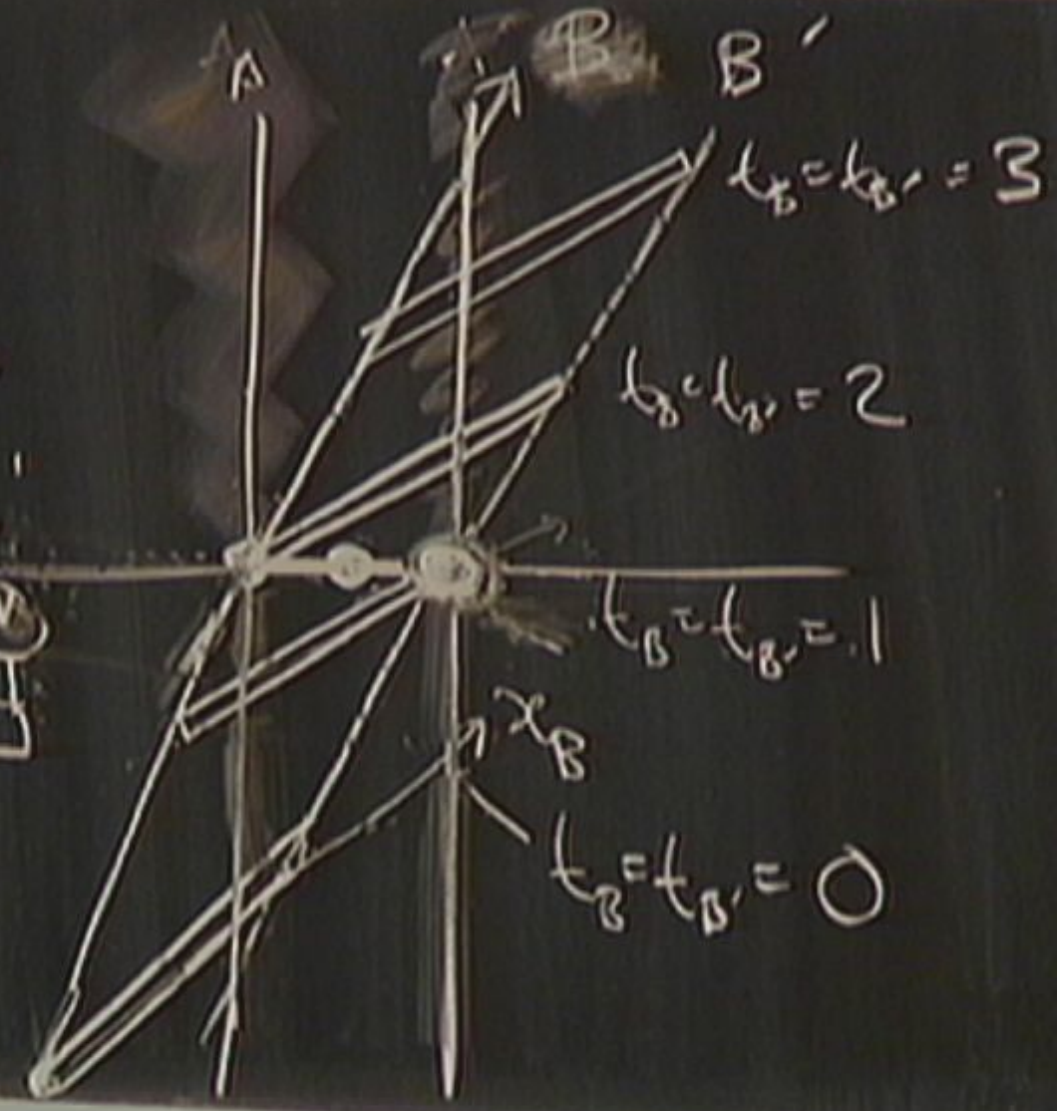
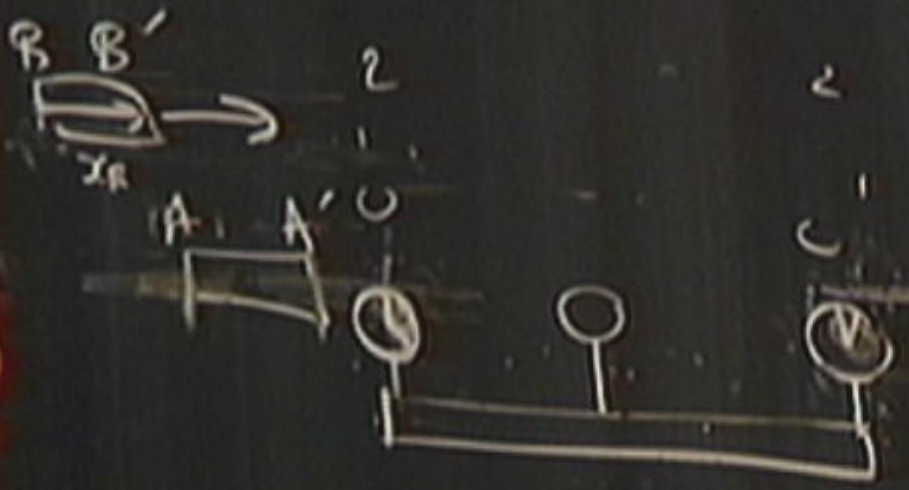
BB' see:



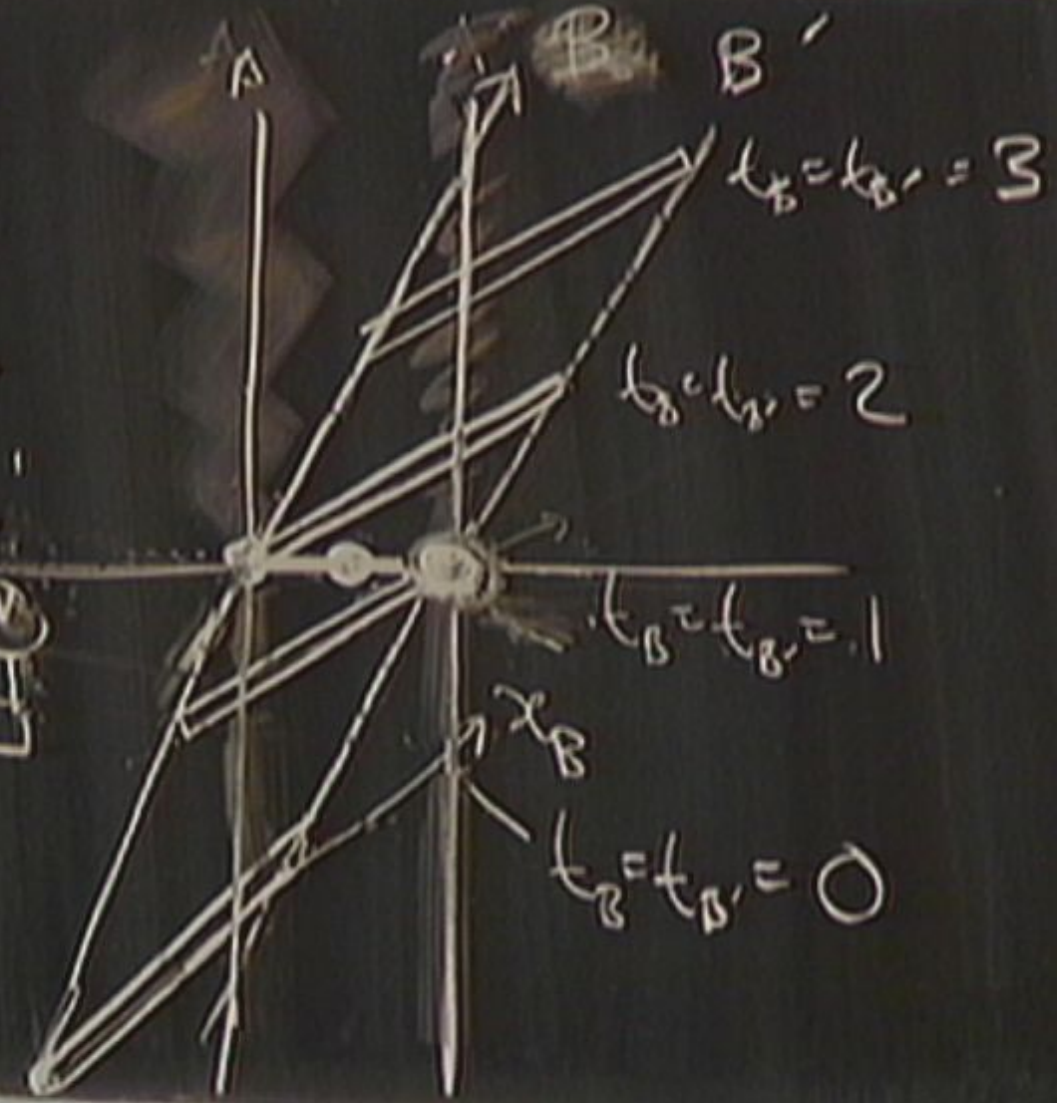
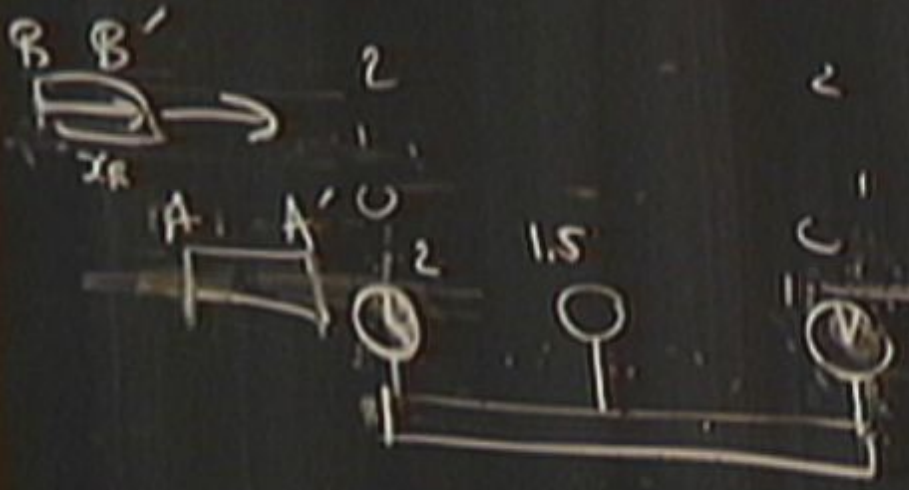
# Length Contraction



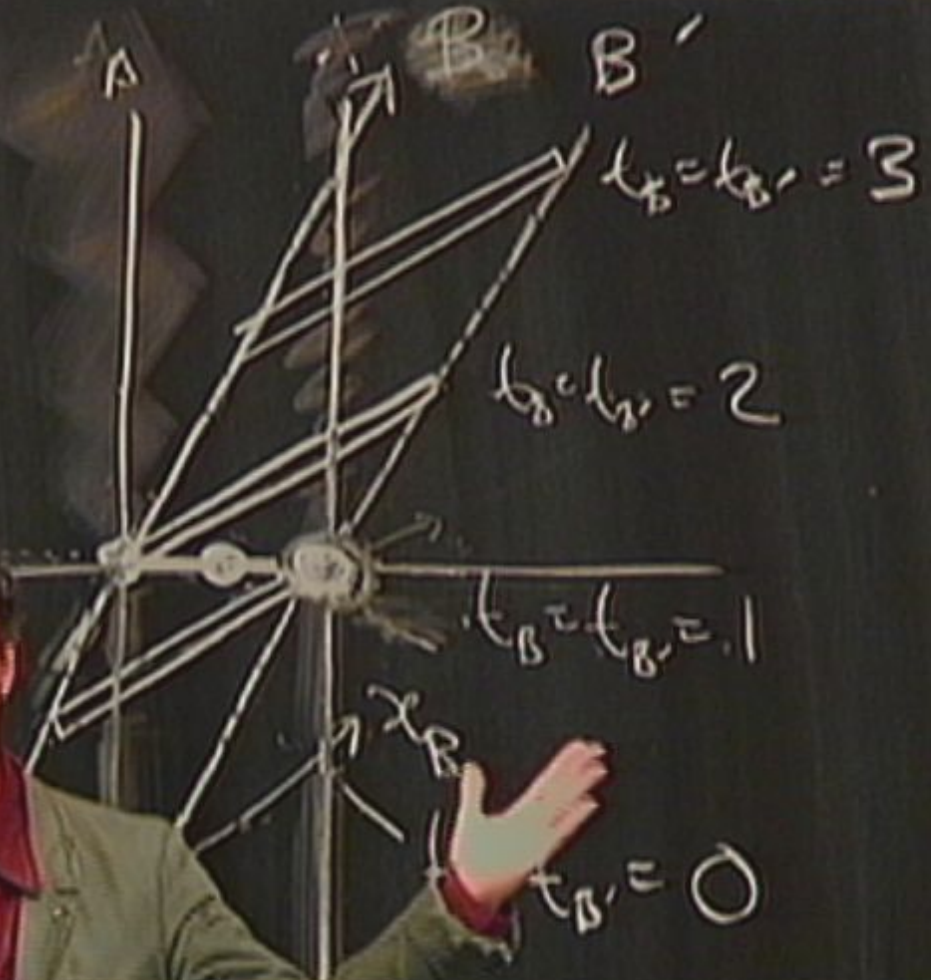
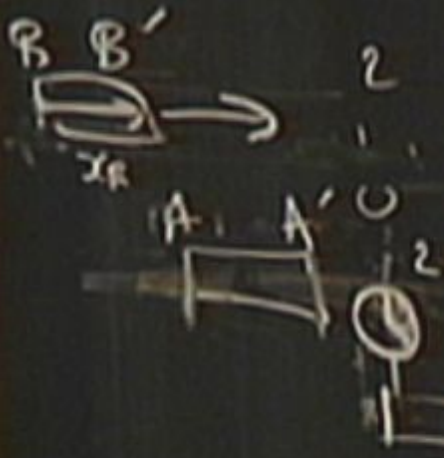
# Length Contraction



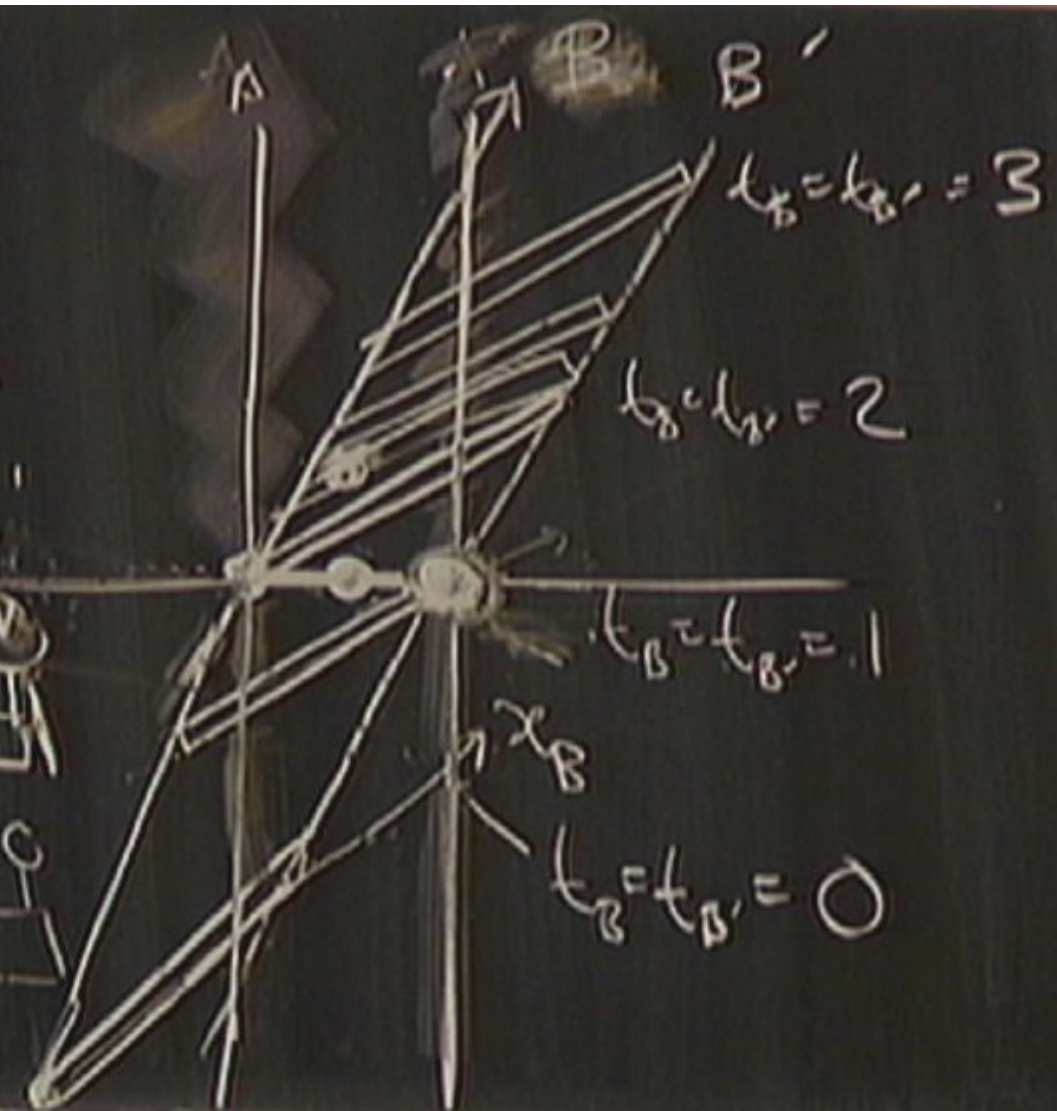
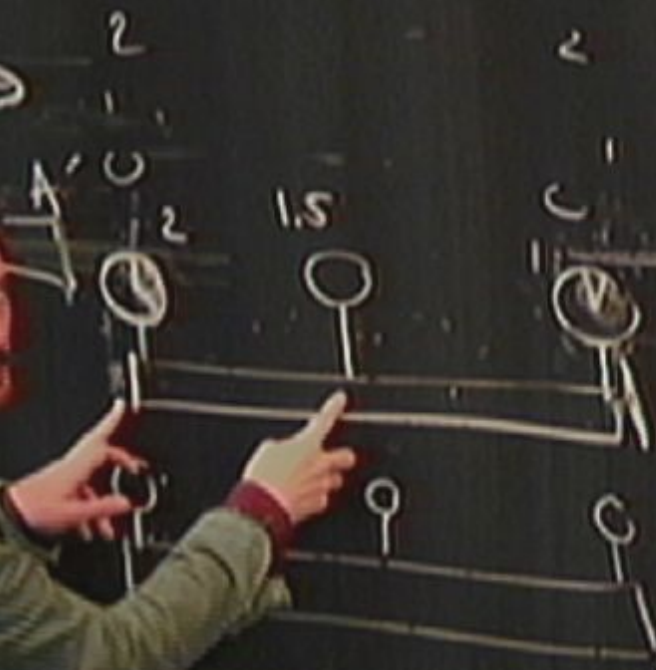
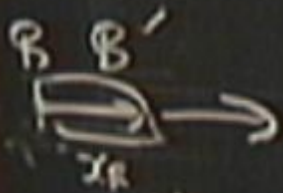
# Length Contraction



# Length Contraction



# Length Contraction



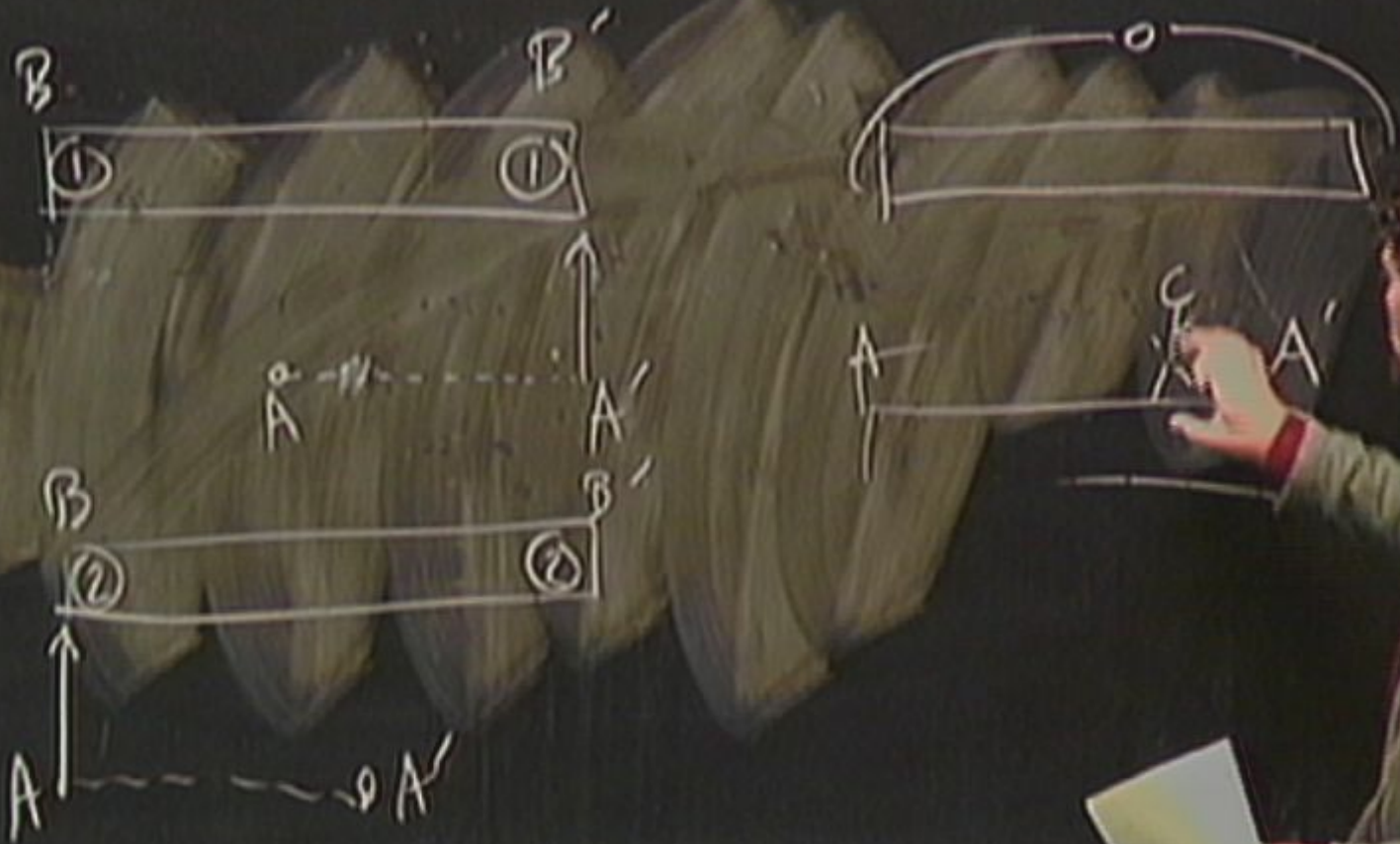
$$t_B = t_{B'} = 3$$

$$x_B = x_{B'} = 2$$

$$t_B = t_{B'} = 1$$

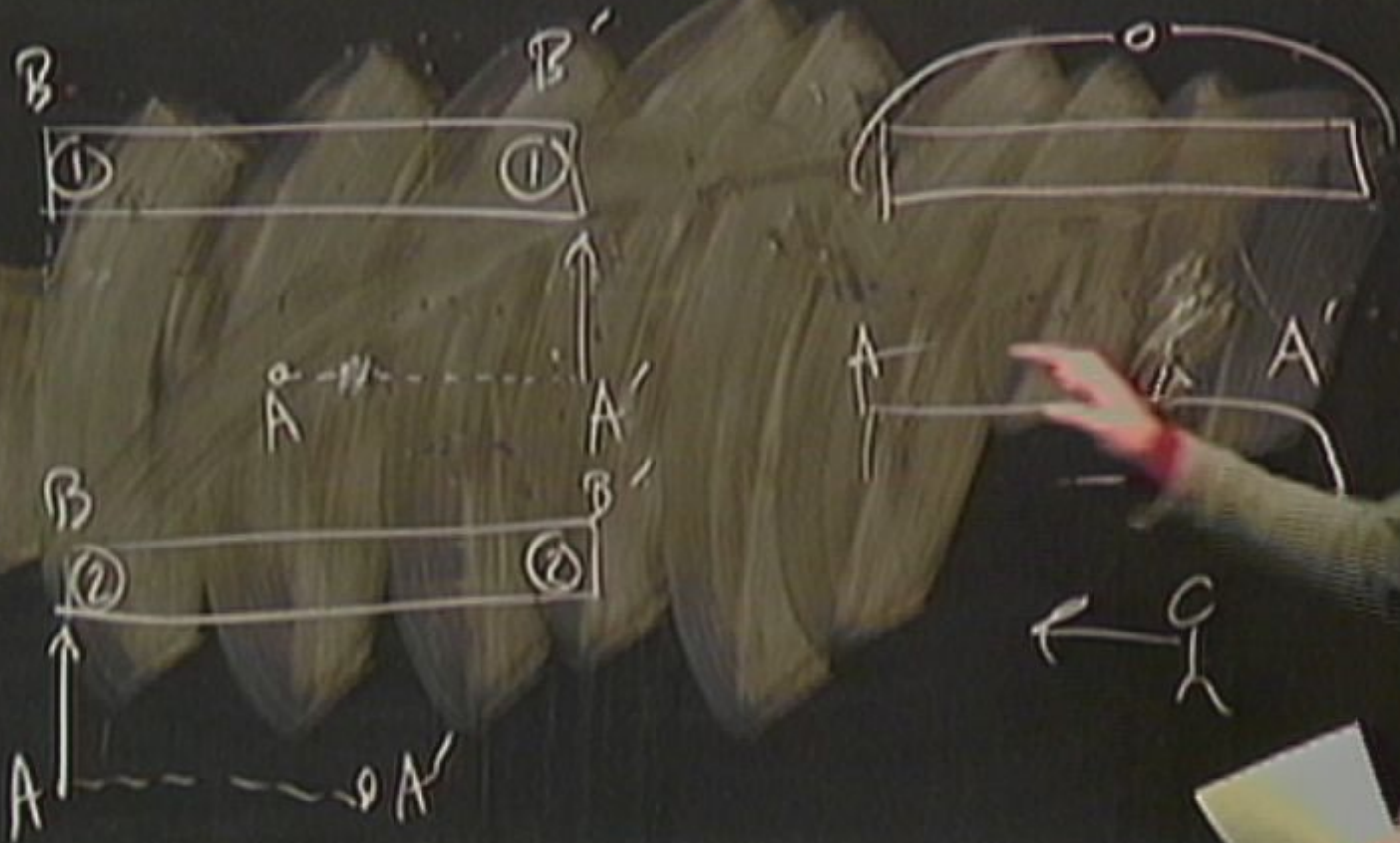
$$x_B = x_{B'} = 0$$

BB' see:

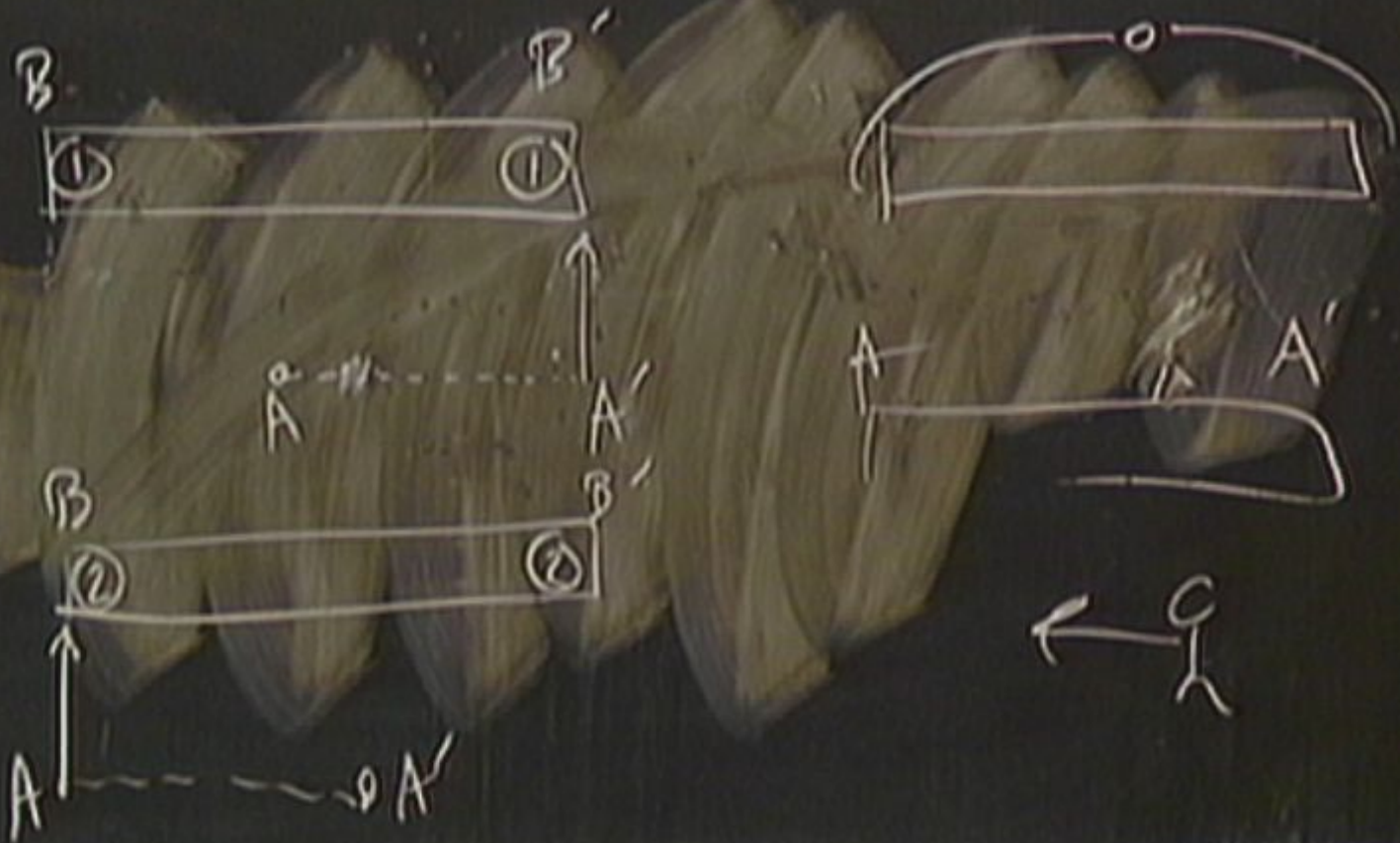




BB' see:

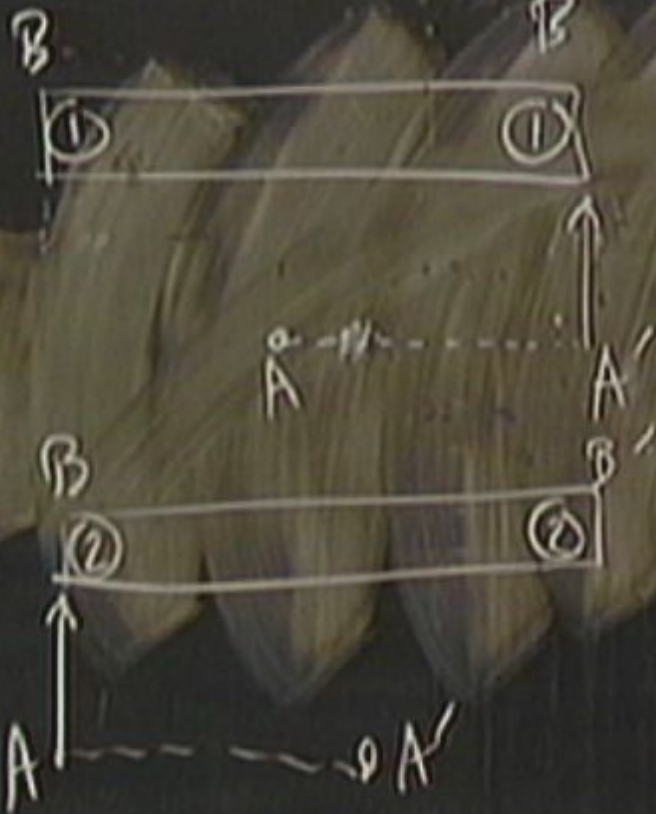


BB' see:

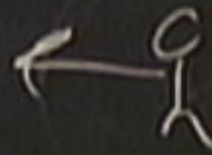
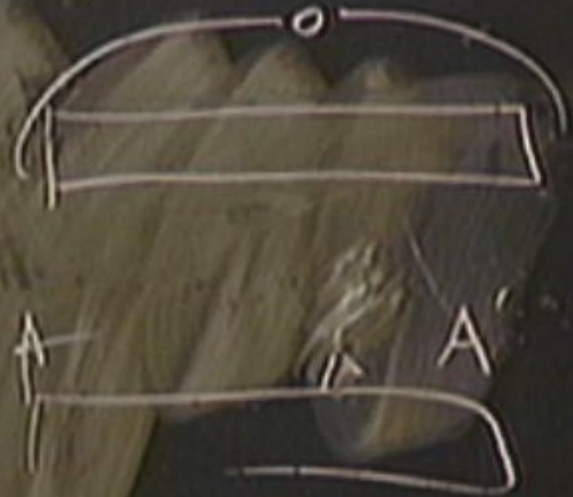




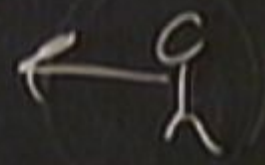
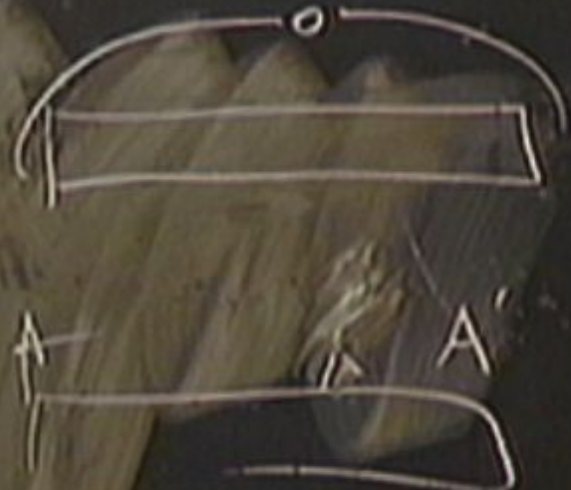
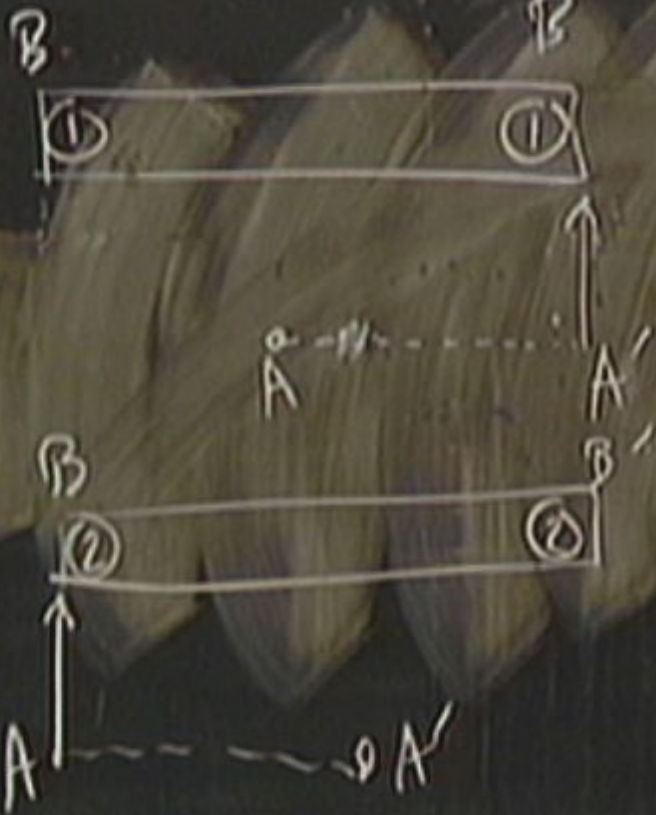
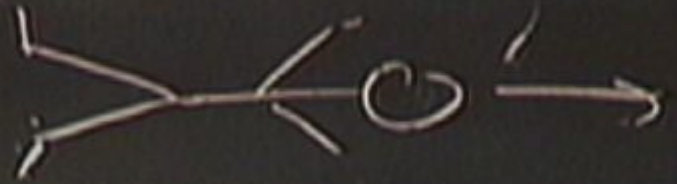
BB' see:



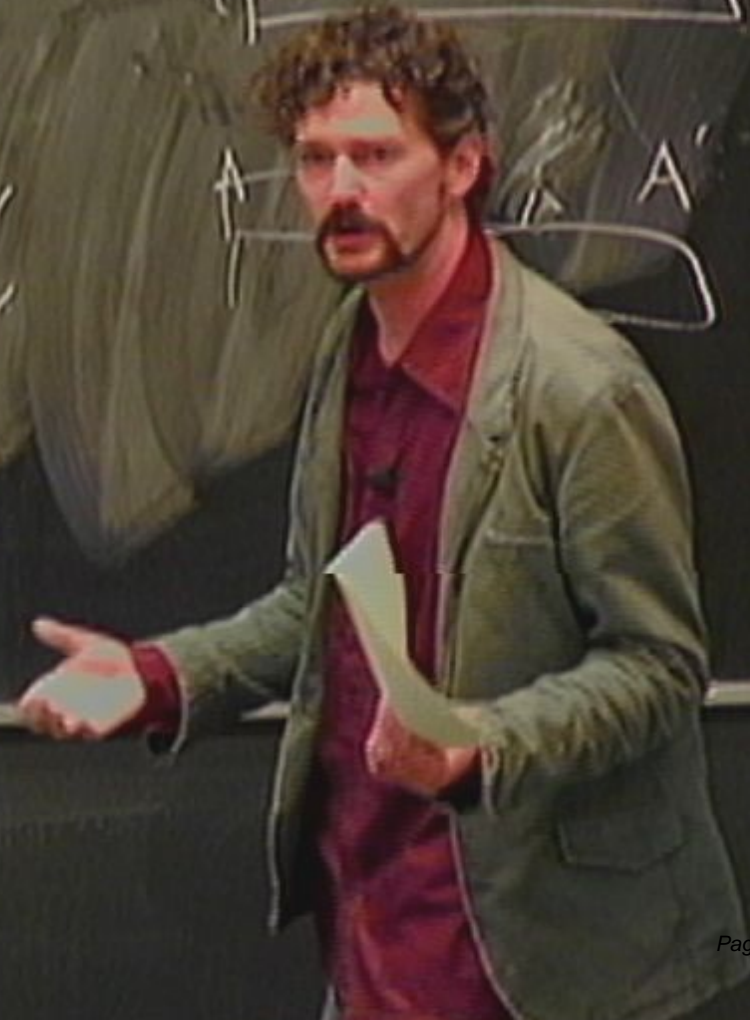
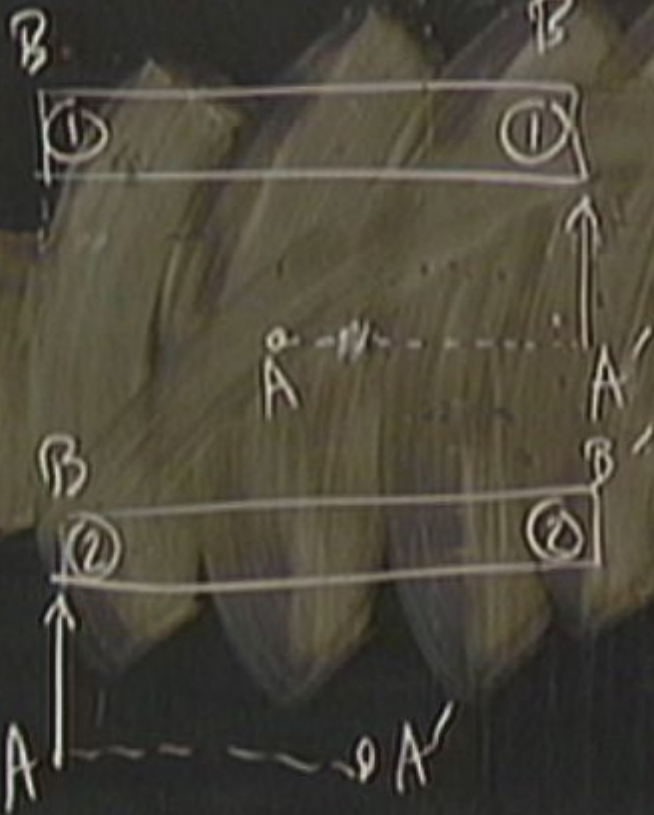
BB' see:



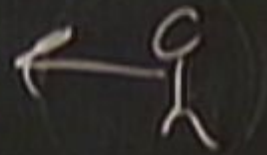
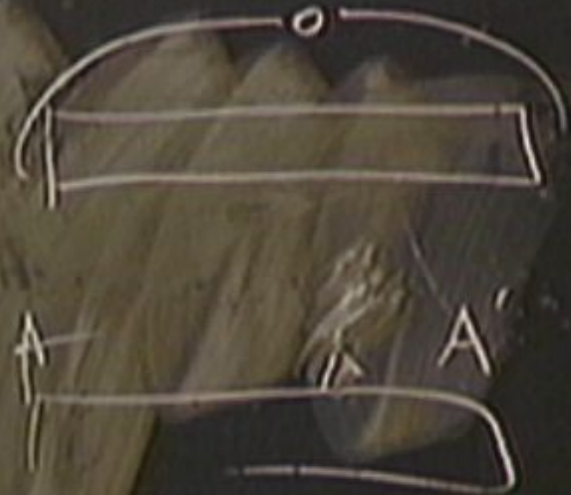
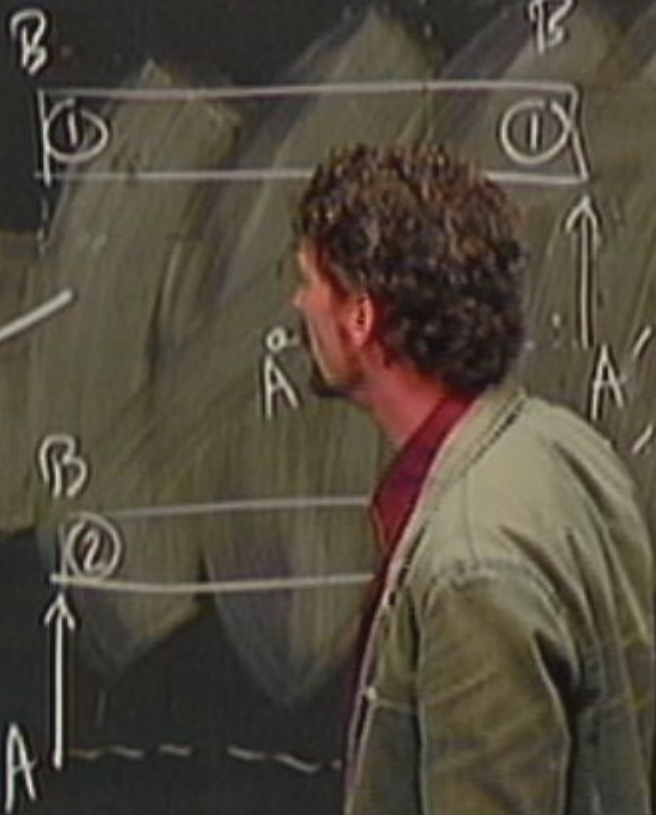
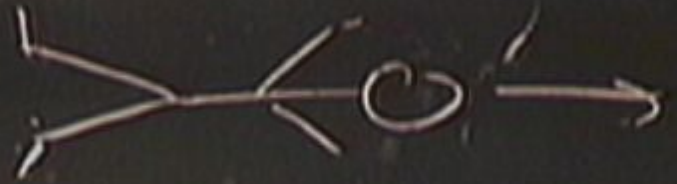
BB' see:



BB' see:

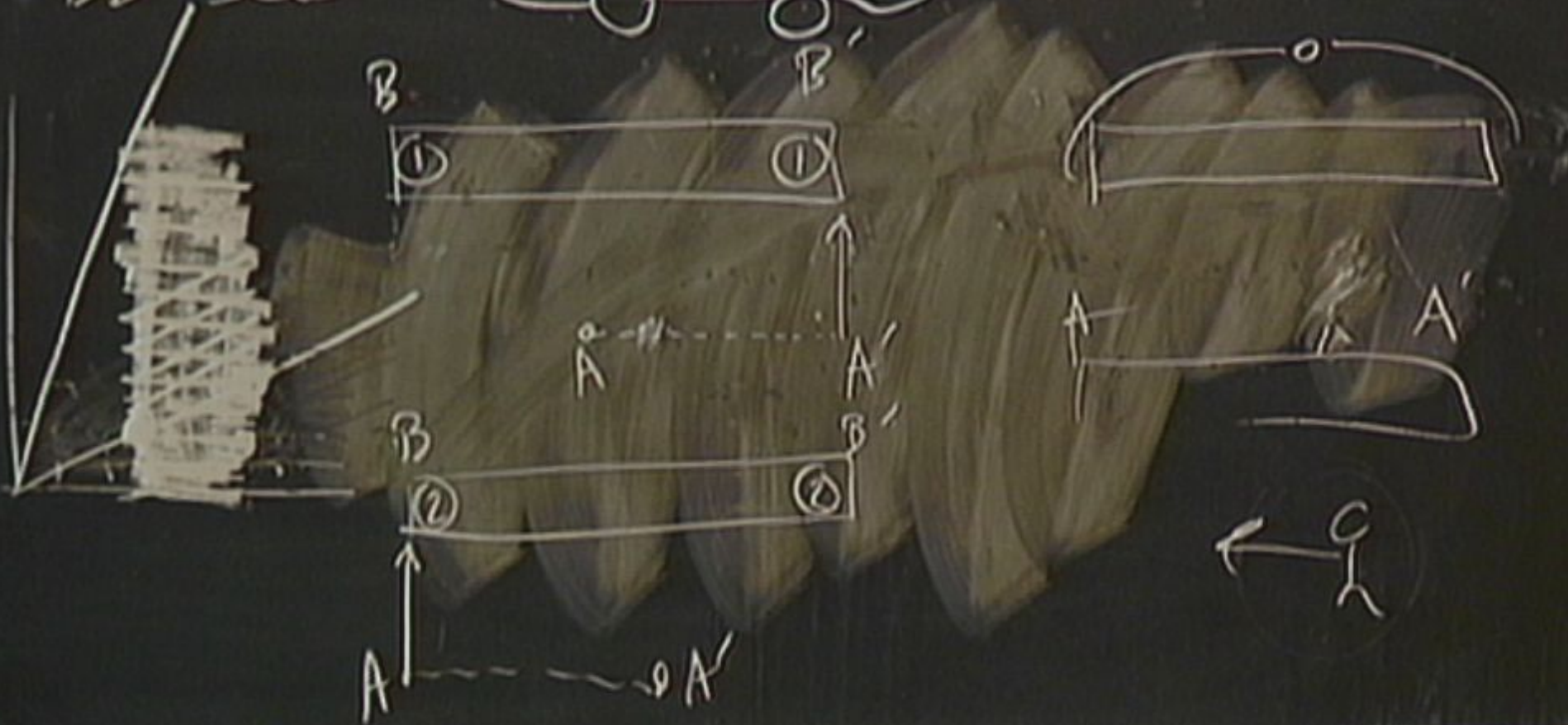
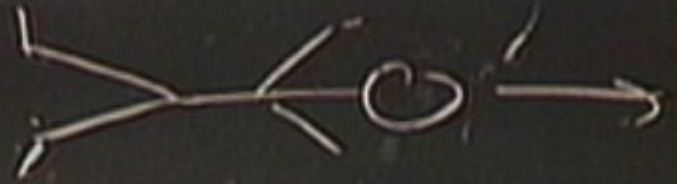


BB' see:





BB' see:

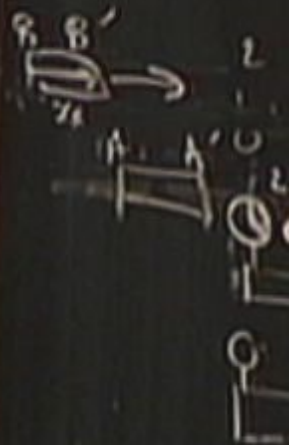


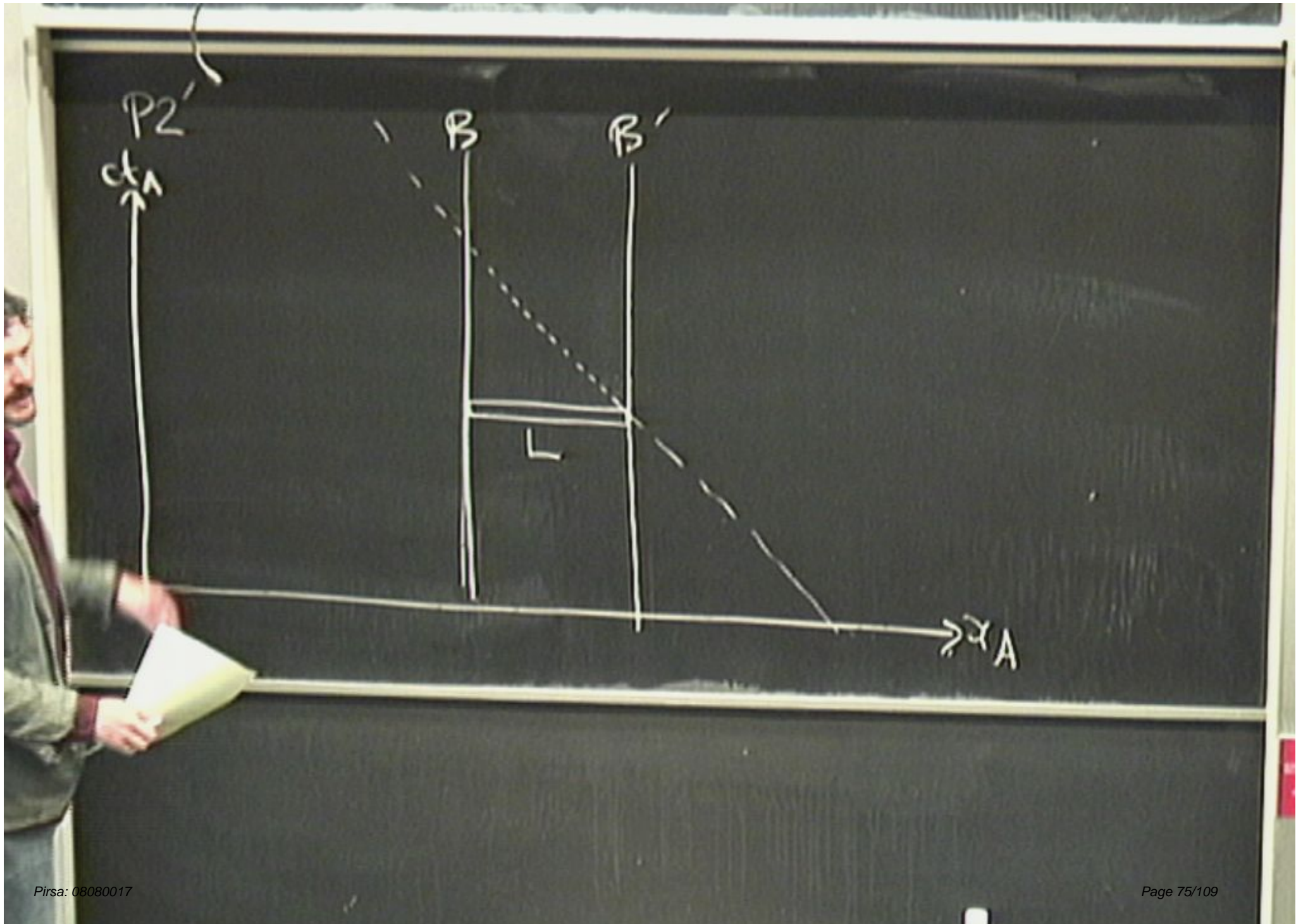
Eucl.

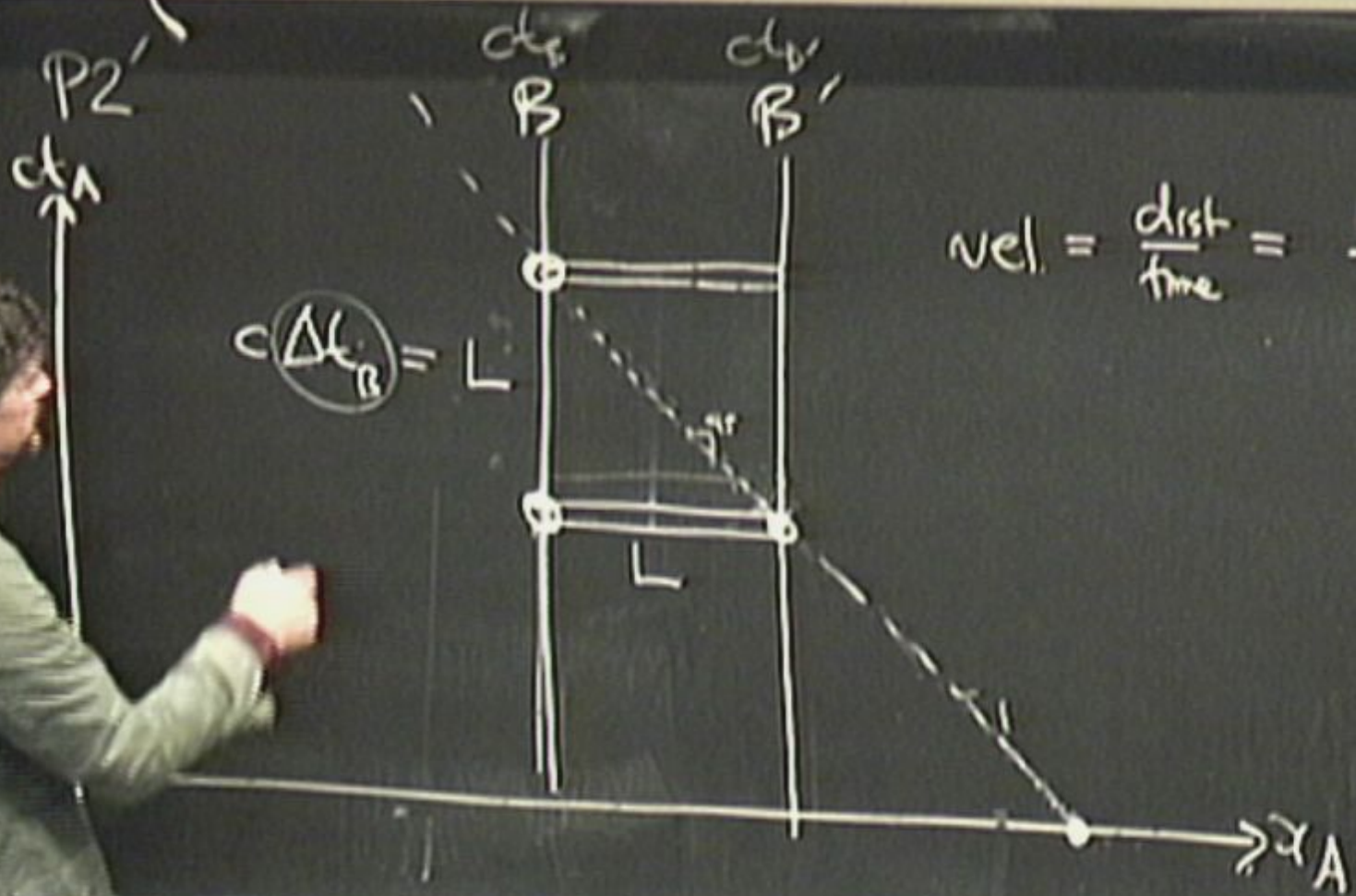
# Geometry

P2'

## Length

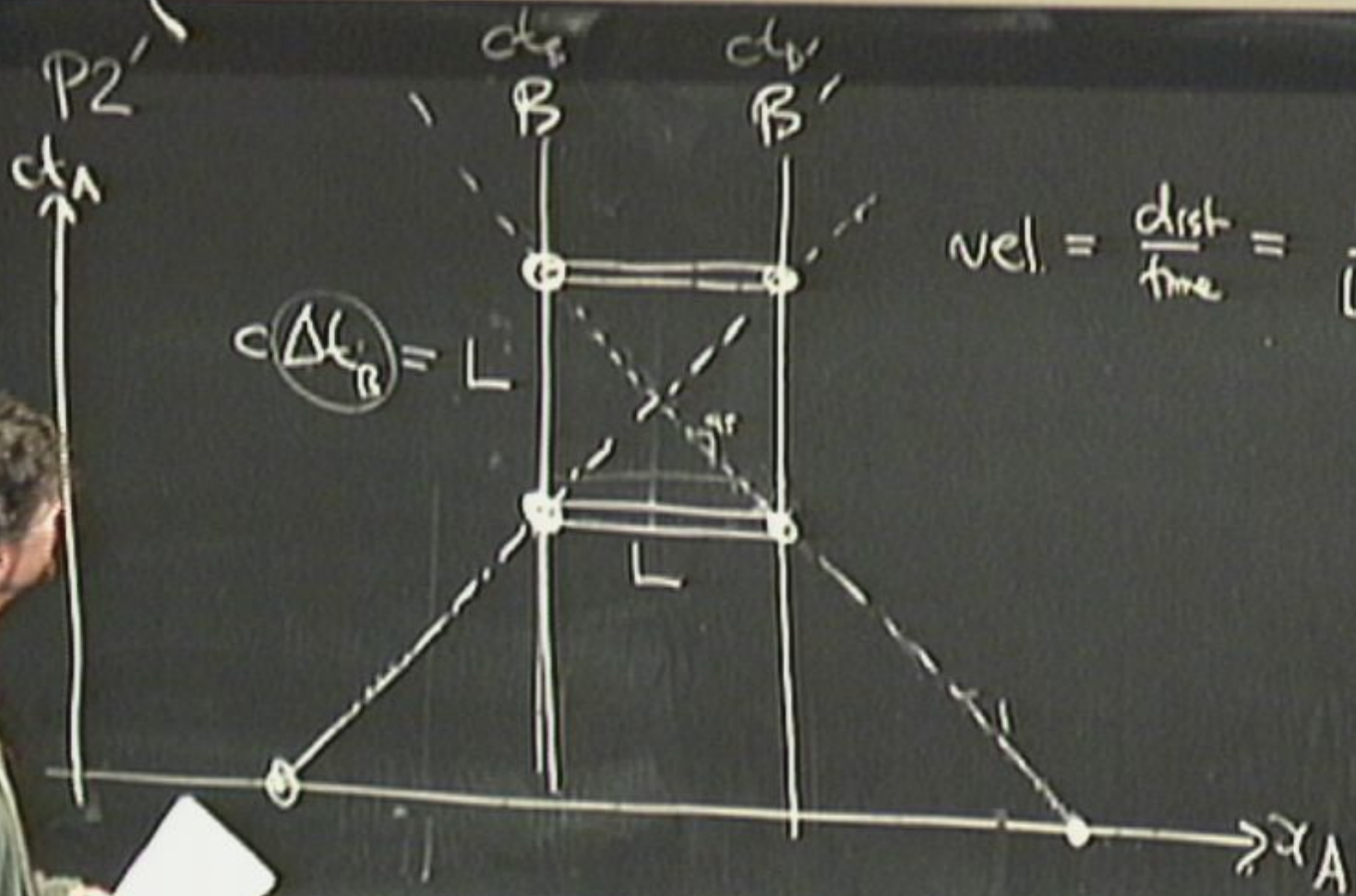




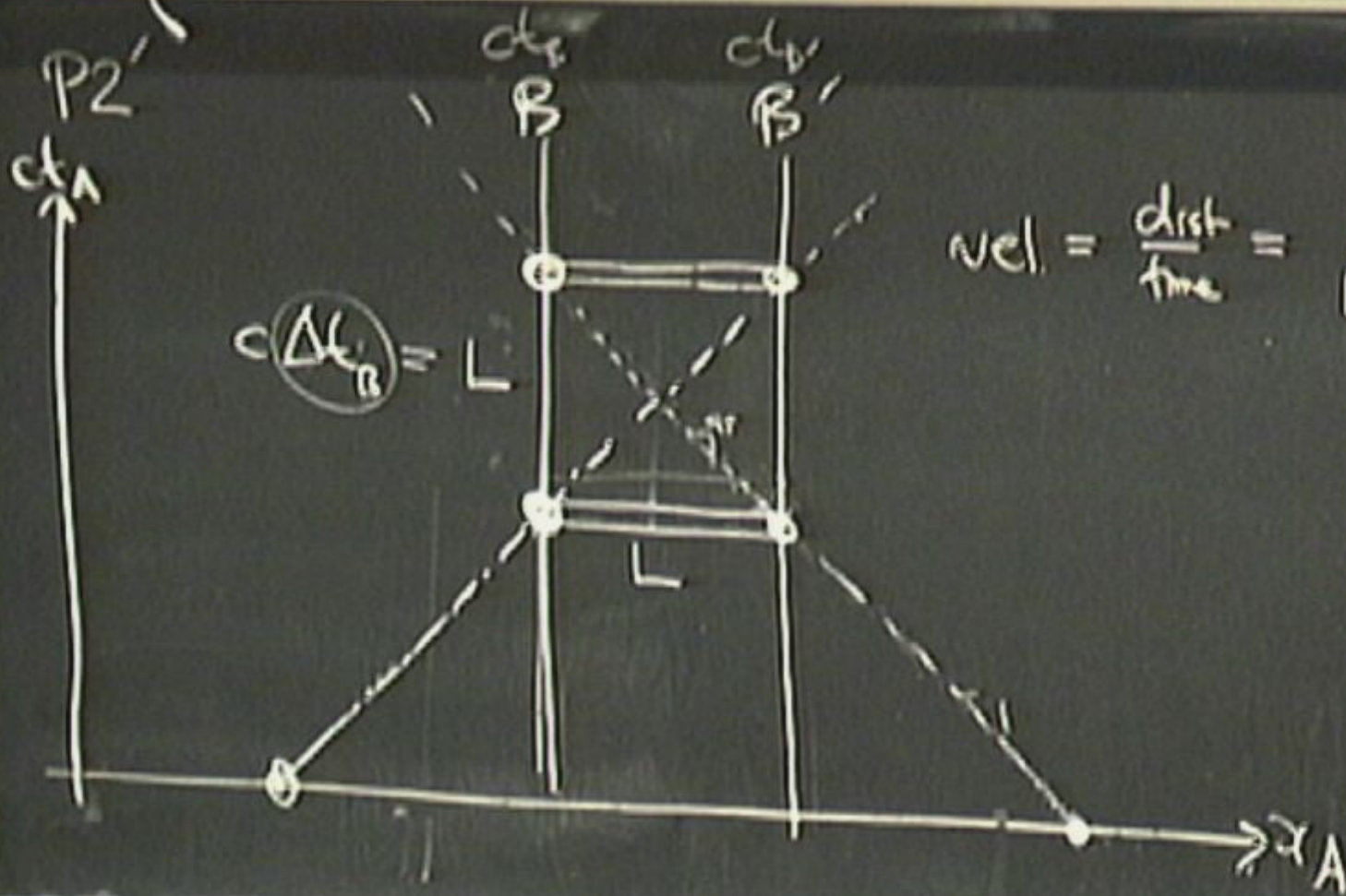


$$vel. = \frac{drst}{time} = \underline{\underline{L}}$$

$$c\Delta t_B = L$$



$$vel. = \frac{dist}{time} = \frac{L}{L/c} = c$$



$$vel = \frac{dist}{time} = \frac{L}{L/c} = c$$

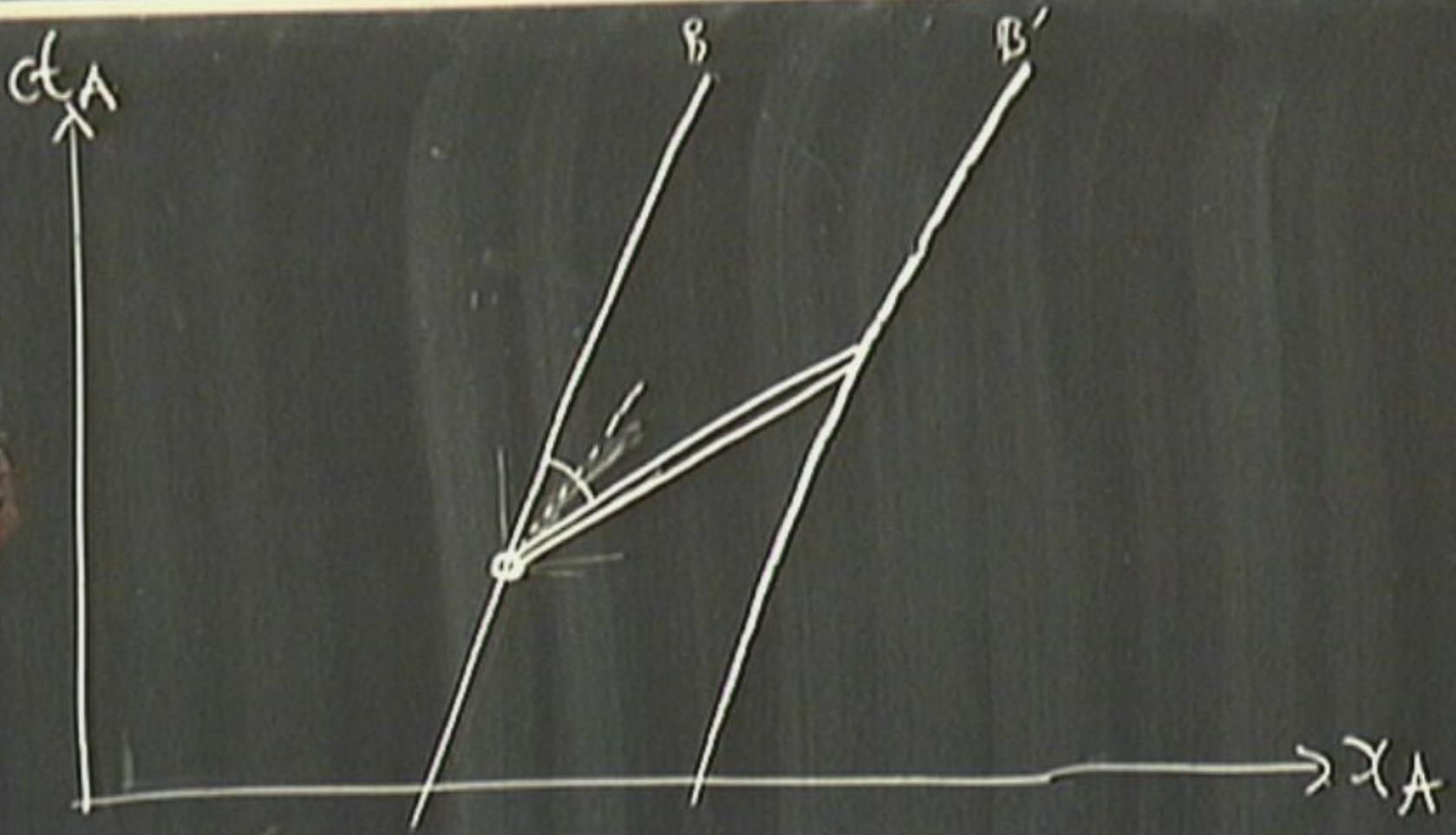
$$c \Delta t_B = L$$

$\alpha_A$

B

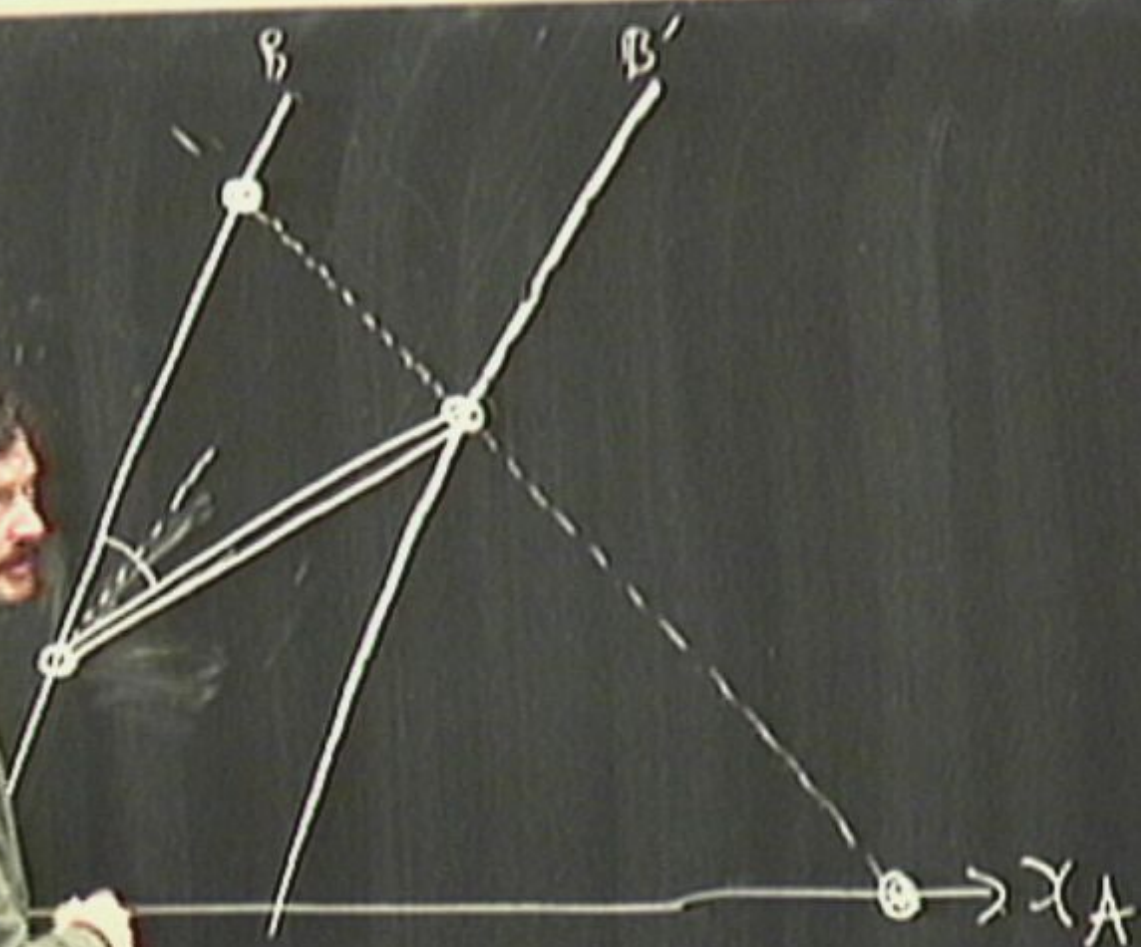
B'

$\chi_A$

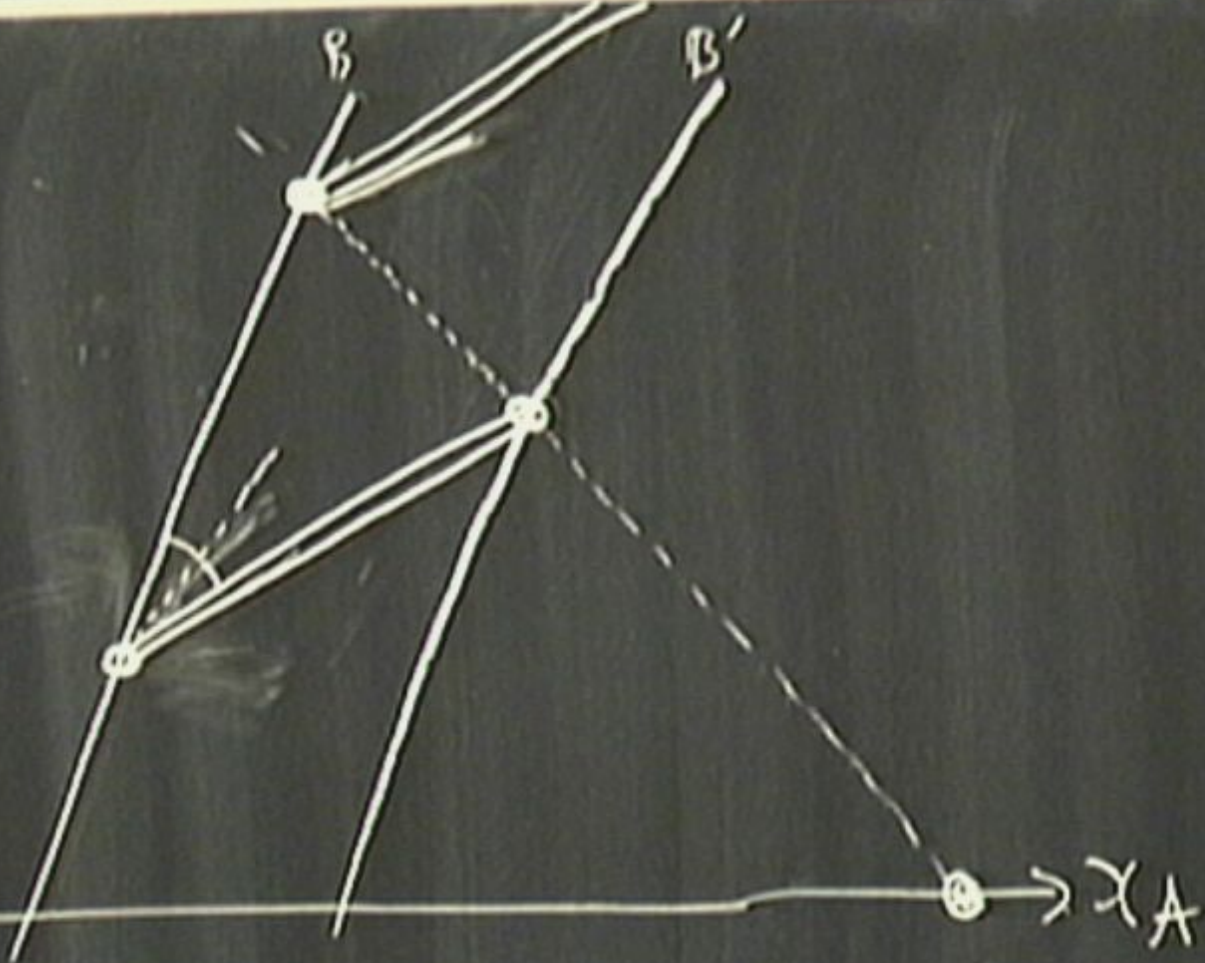




$\alpha_A$



$\alpha_A$



$\alpha_A$

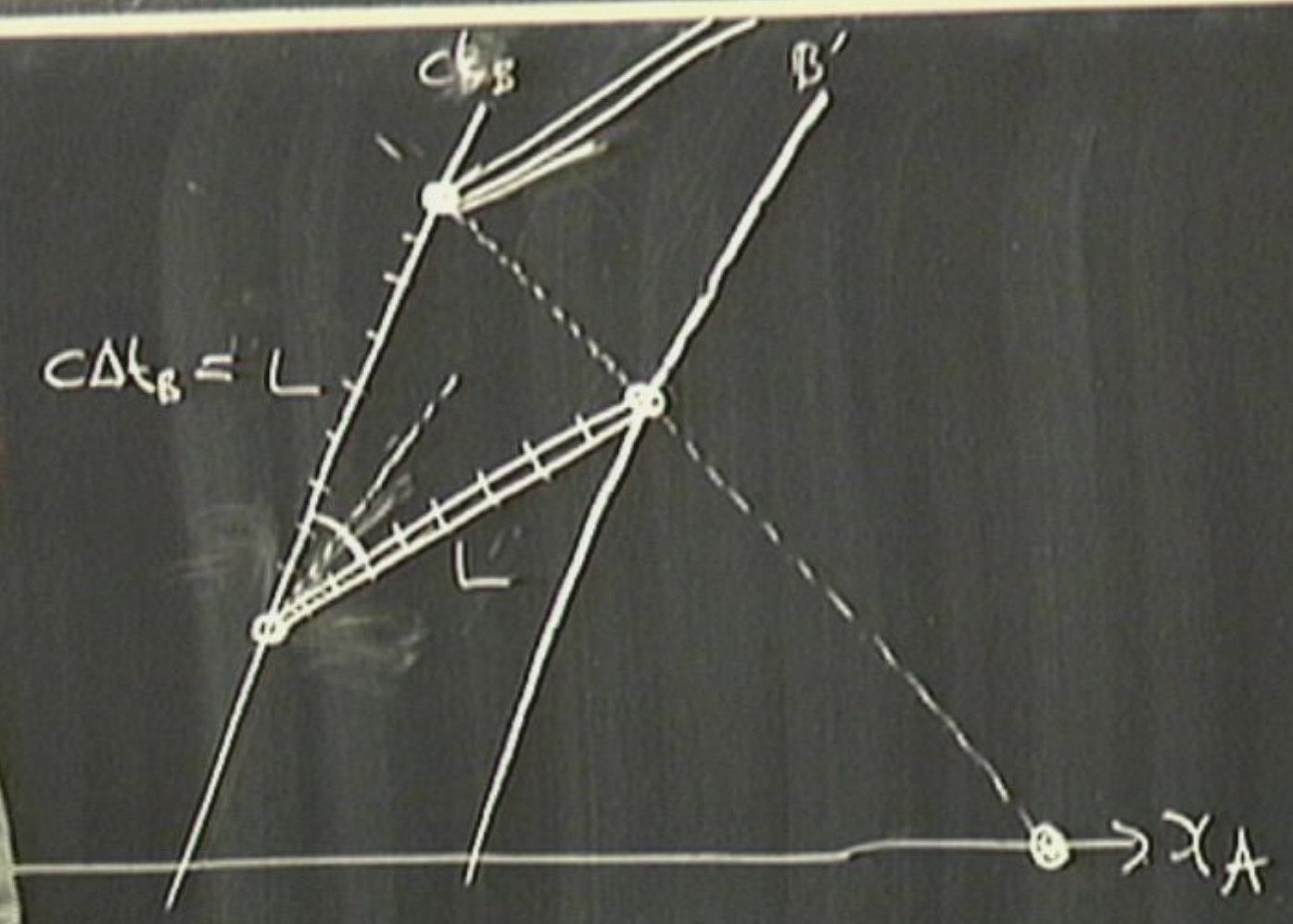
$C\Delta t_B = L$

$Ct_B$

B'

L

$\alpha_A$



$\alpha_A$

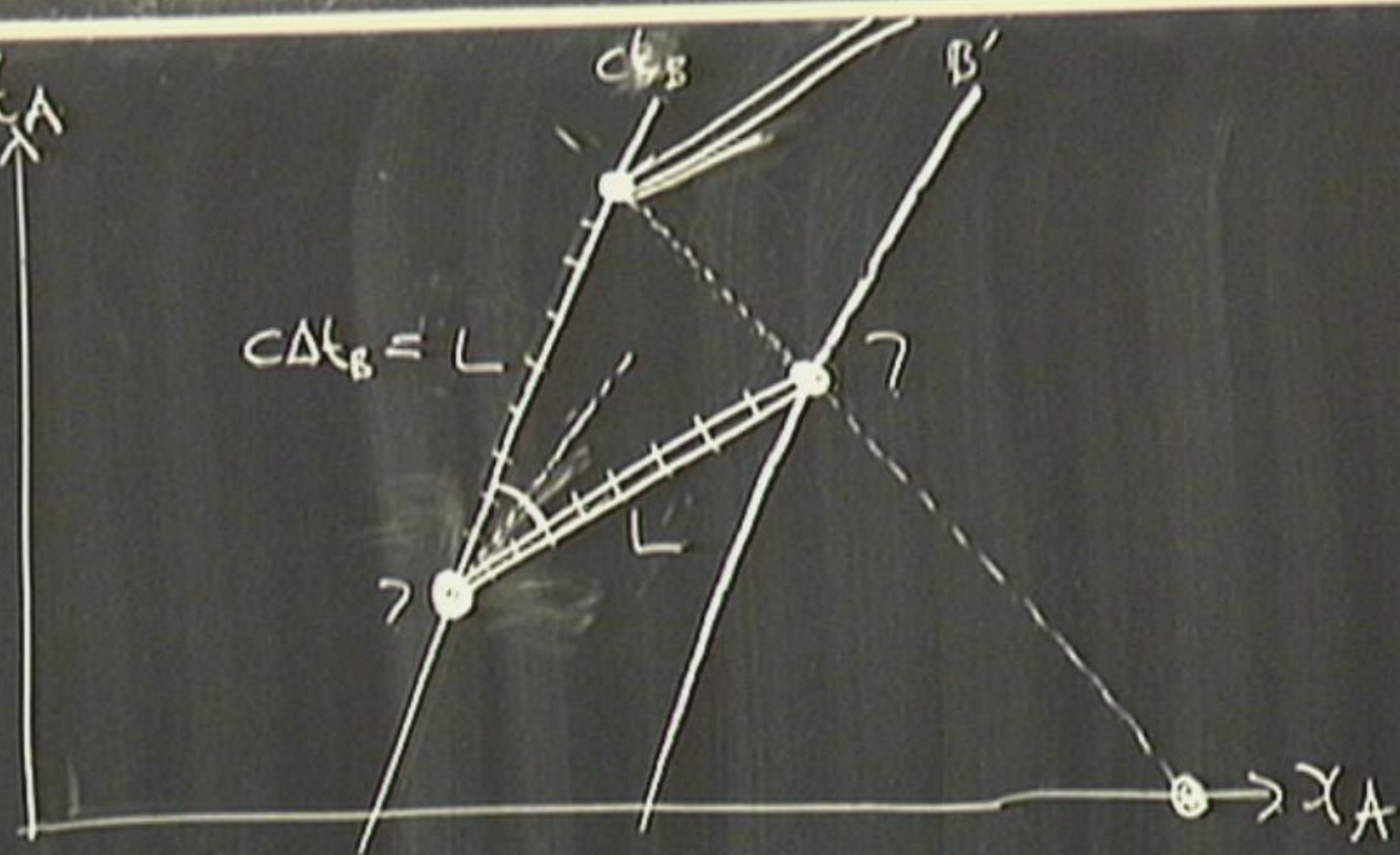
$\alpha_B$

$B'$

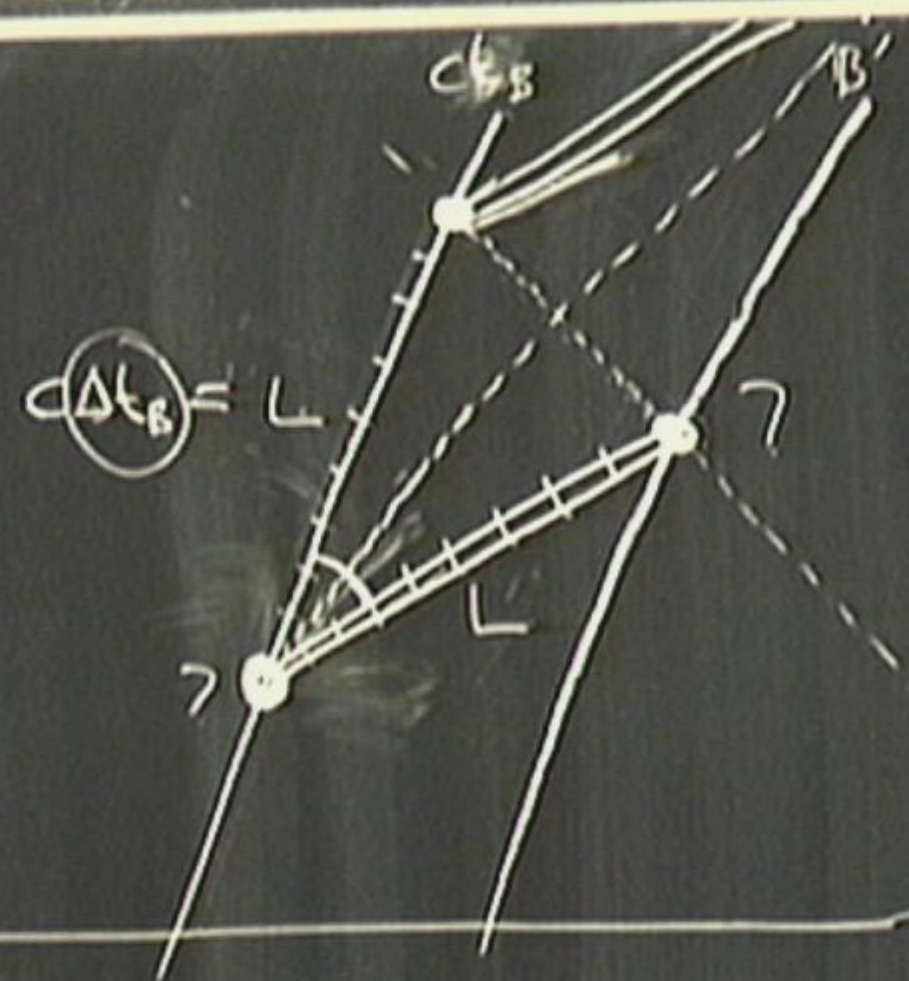
$C\Delta t_B = L$

$L$

$\alpha_A$

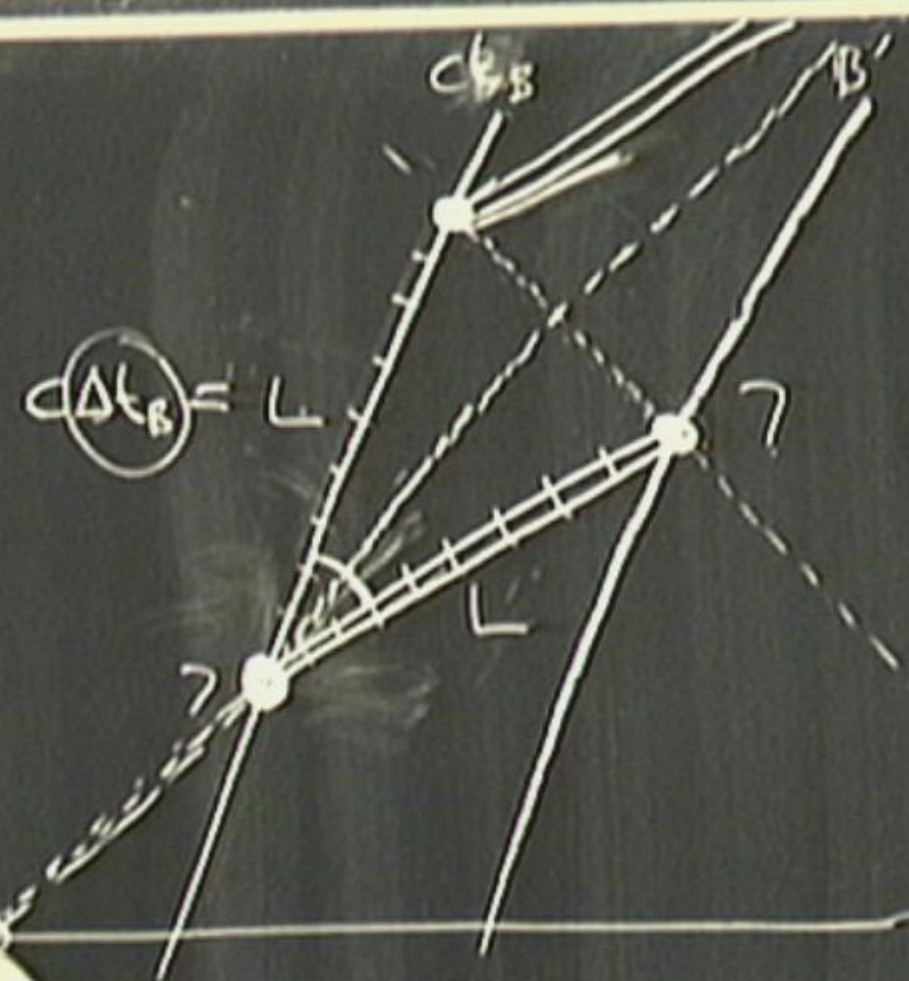


$x_A$



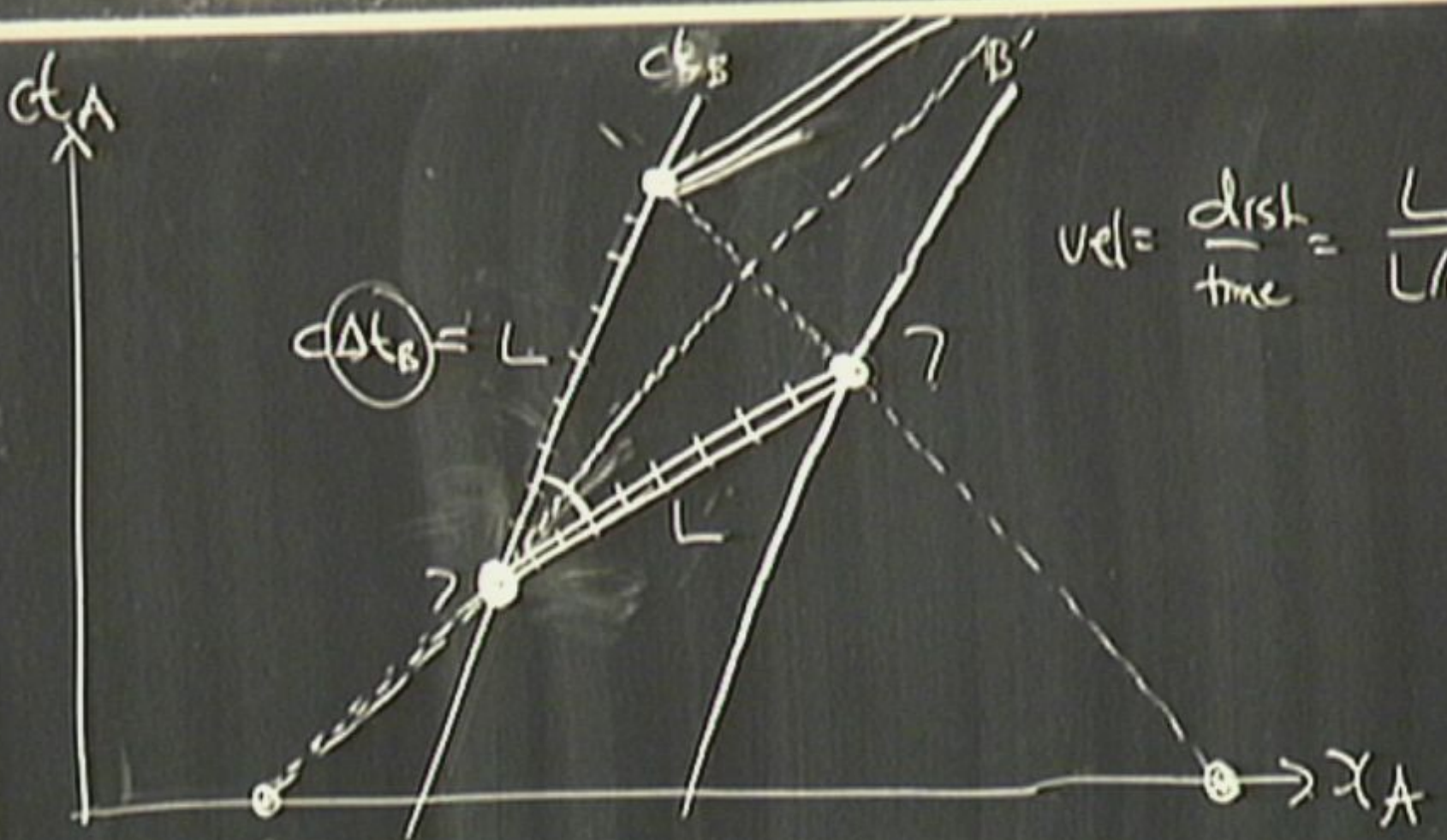
$$vel = \frac{dist}{time} = \frac{L}{L/c} = c$$

$c_A$



$$vel = \frac{dist}{time} = \frac{L}{L/c} = c$$

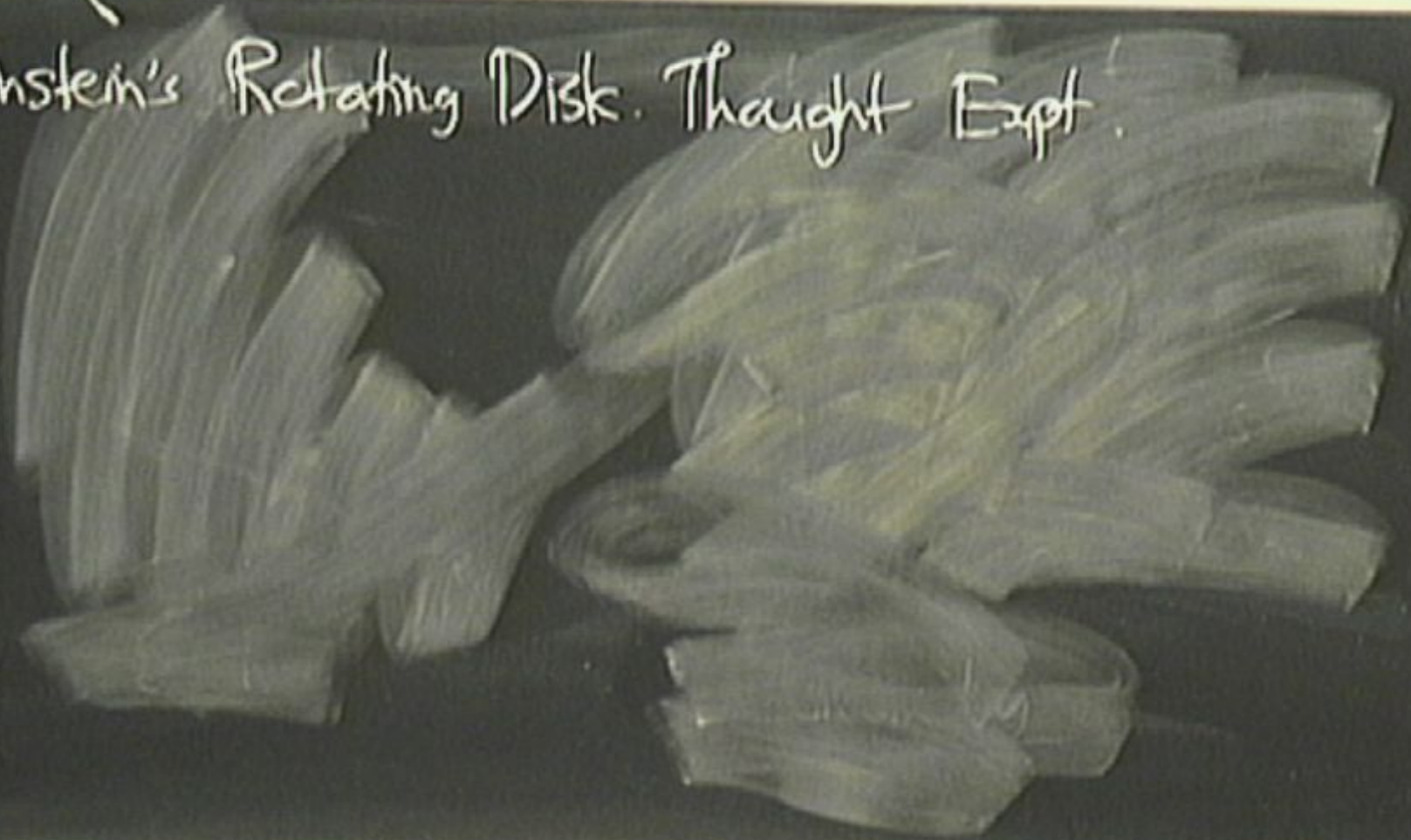
$x_A$



$$vel = \frac{dist}{time} = \frac{L}{L/c} = c$$

$$c\Delta t_B = L$$

Einstein's Rotating Disk Thought Expt.

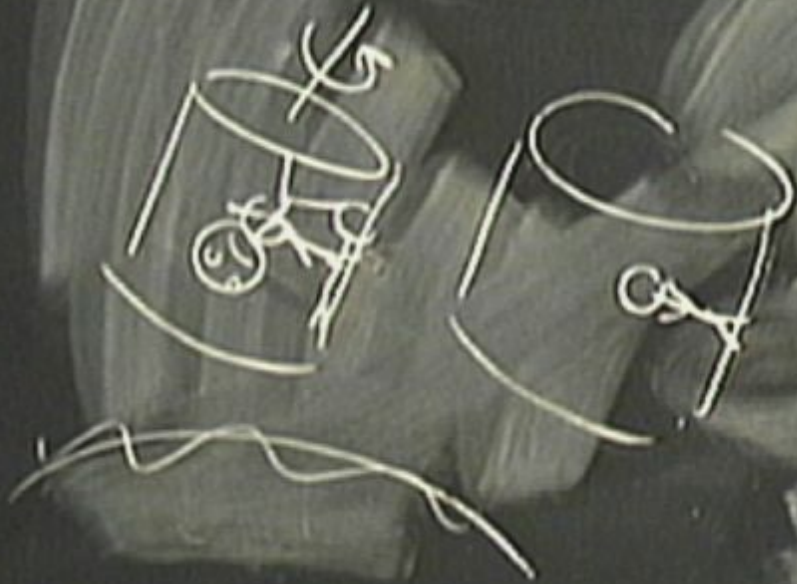




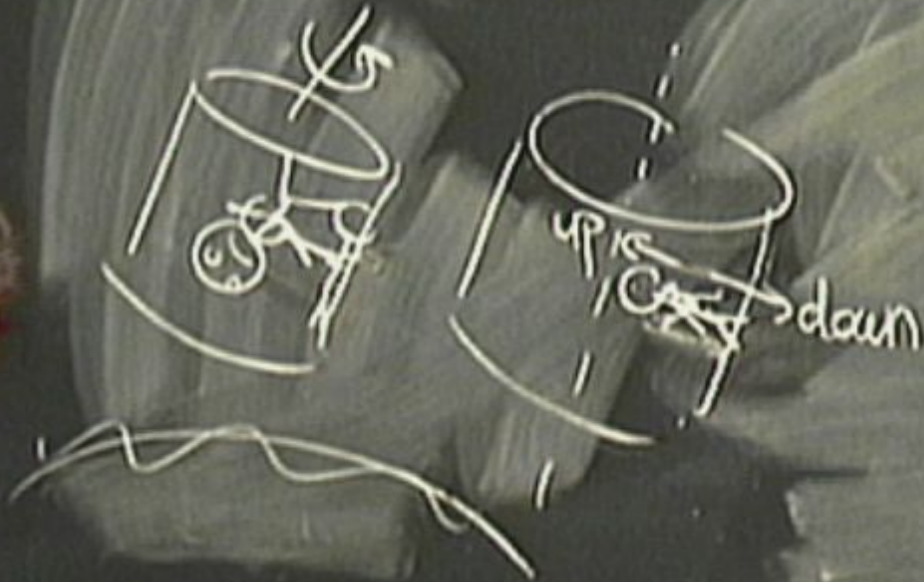
Einstein's Rotating Disk Thought Expt.



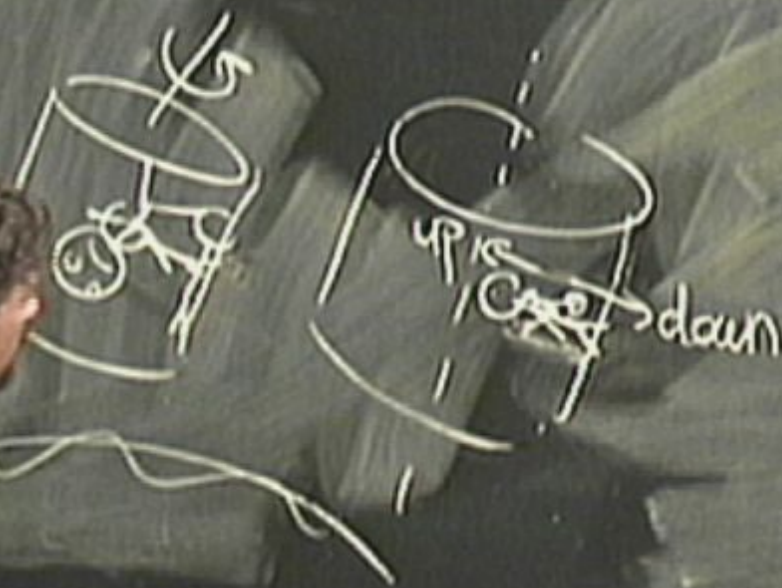
# Einstein's Rotating Disk Thought Expt.



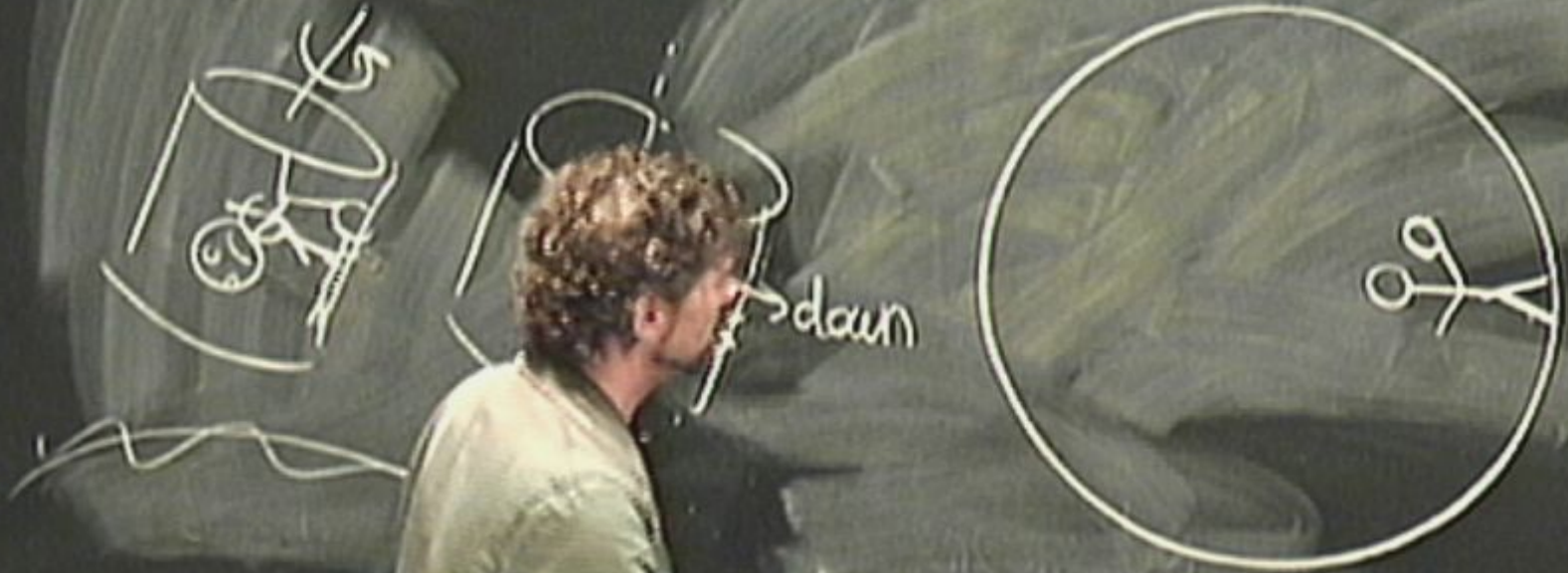
# Einstein's Rotating Disk Thought Expt.



# Einstein's Rotating Disk Thought Expt.



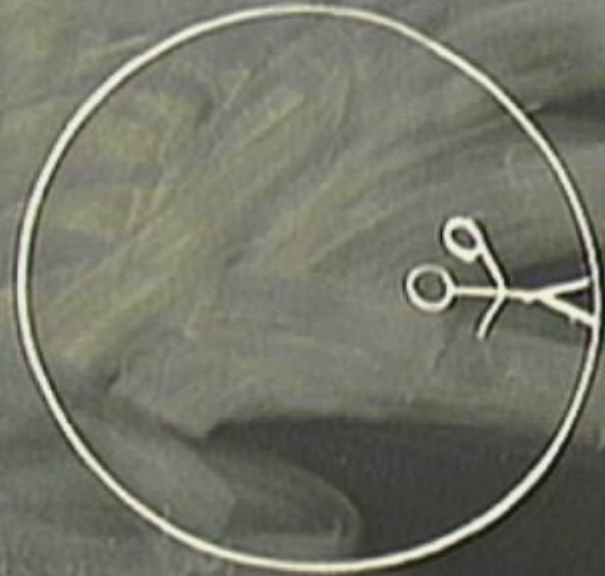
# Einsteins Rotating Disk Thought Expt.



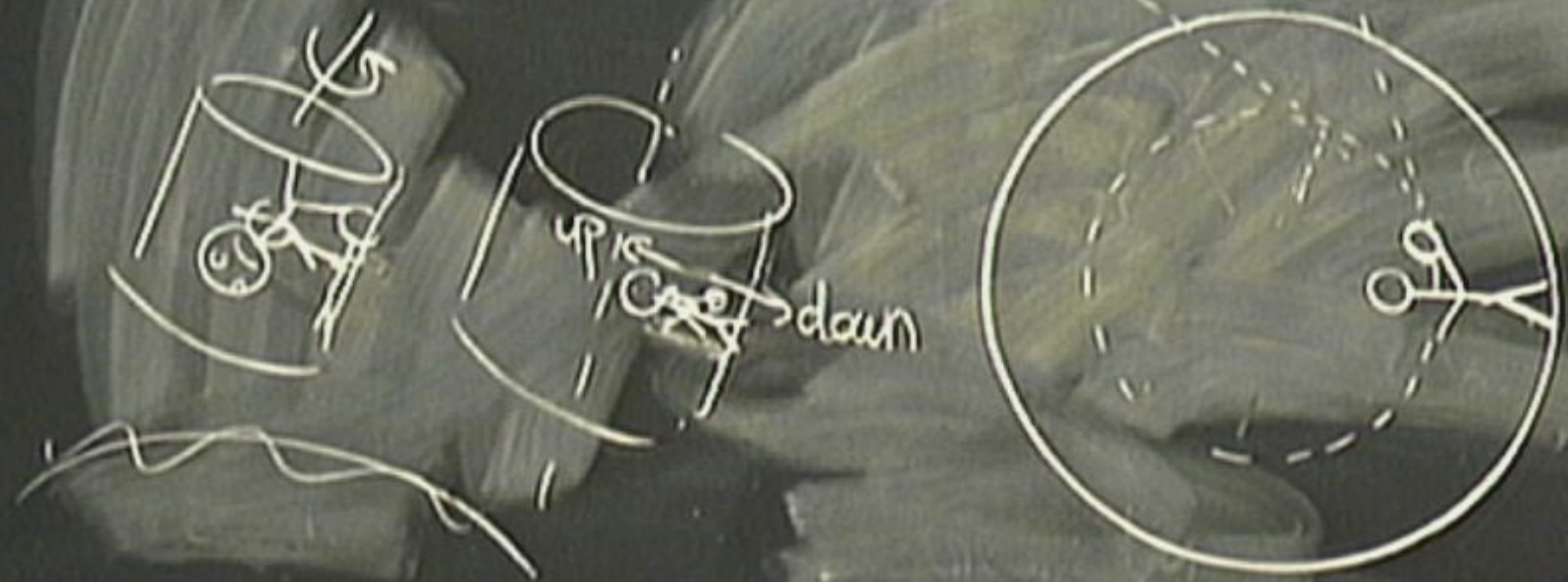
# Einstein's Rotating Disk Thought Expt

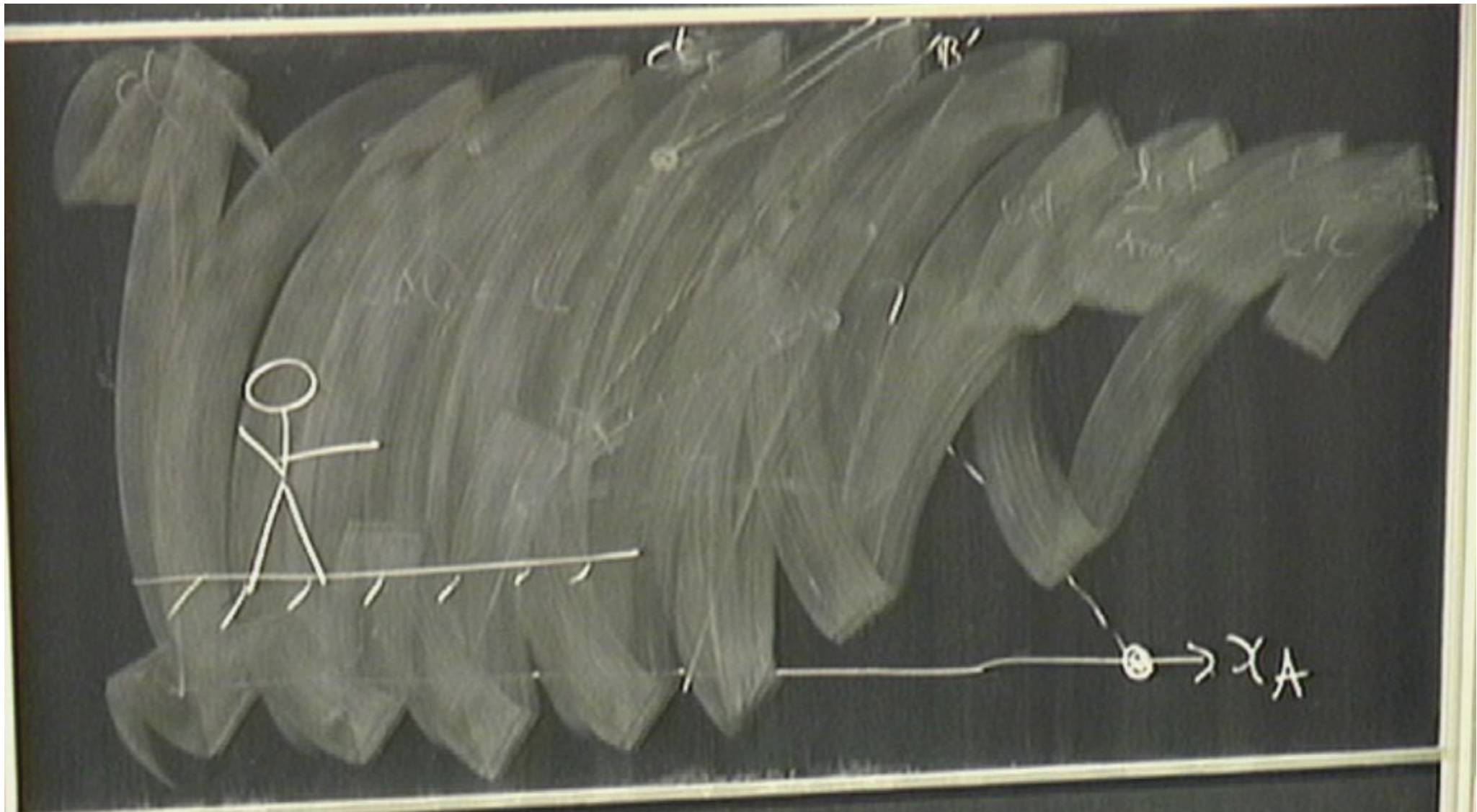


down

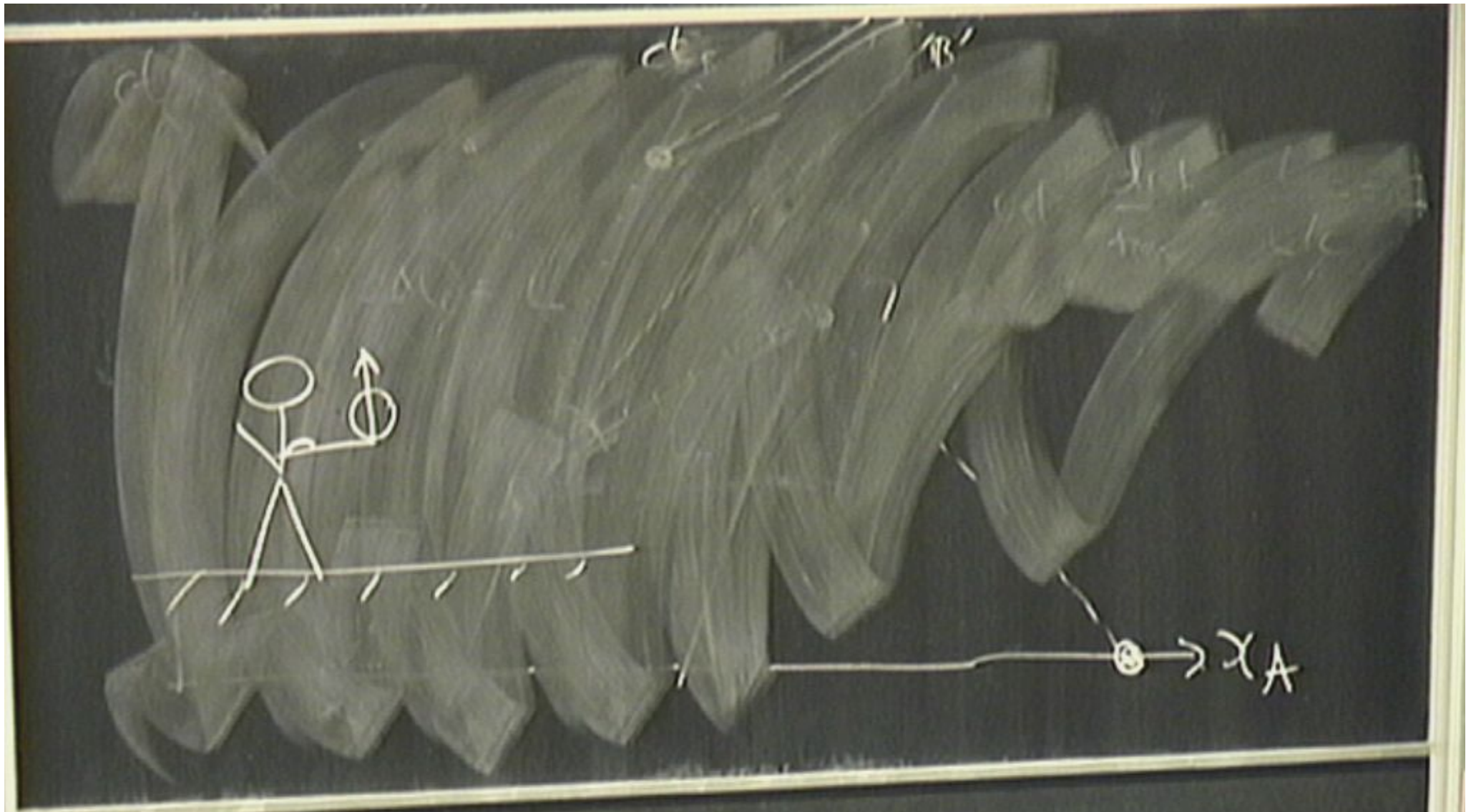


# Einstein's Rotating Disk Thought Expt







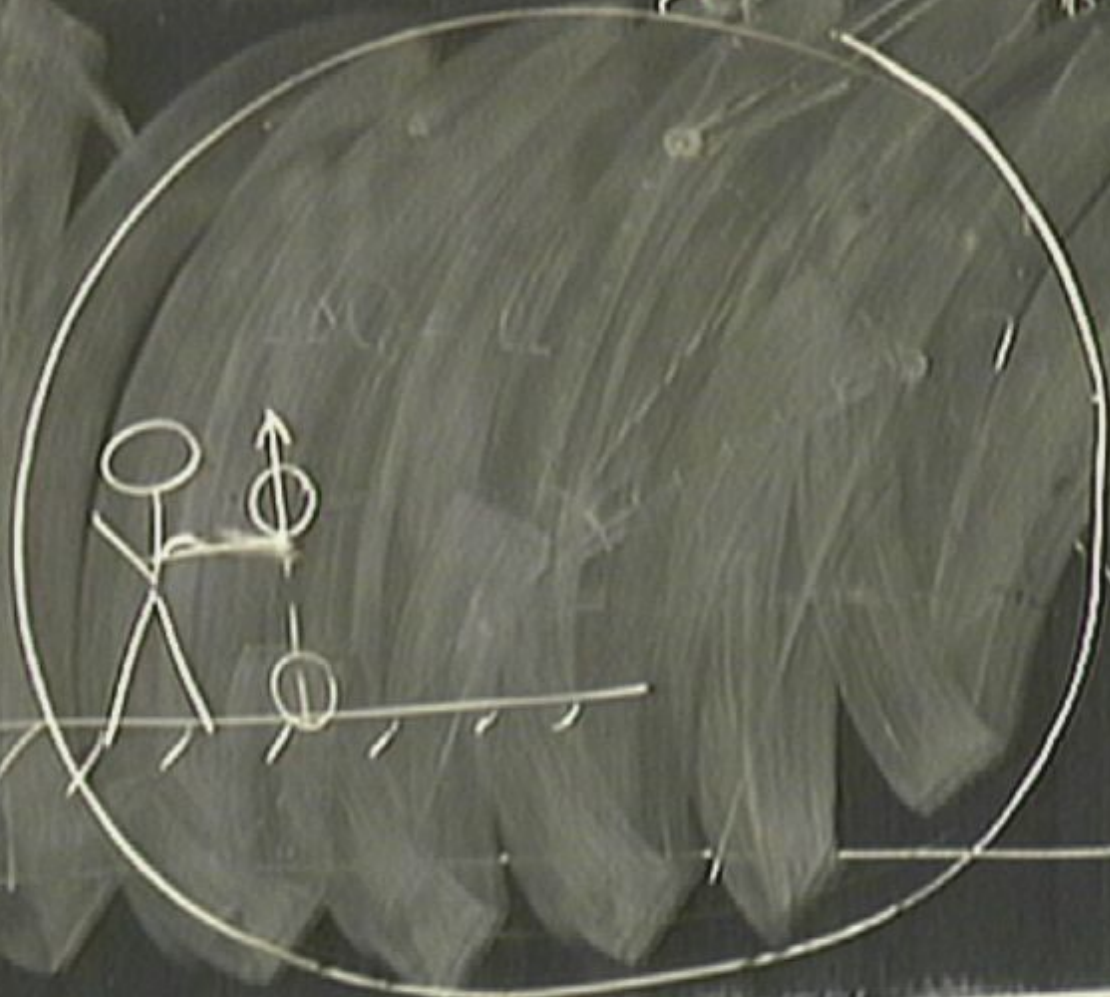


# Einstein's Rotating Disk Thought Expt

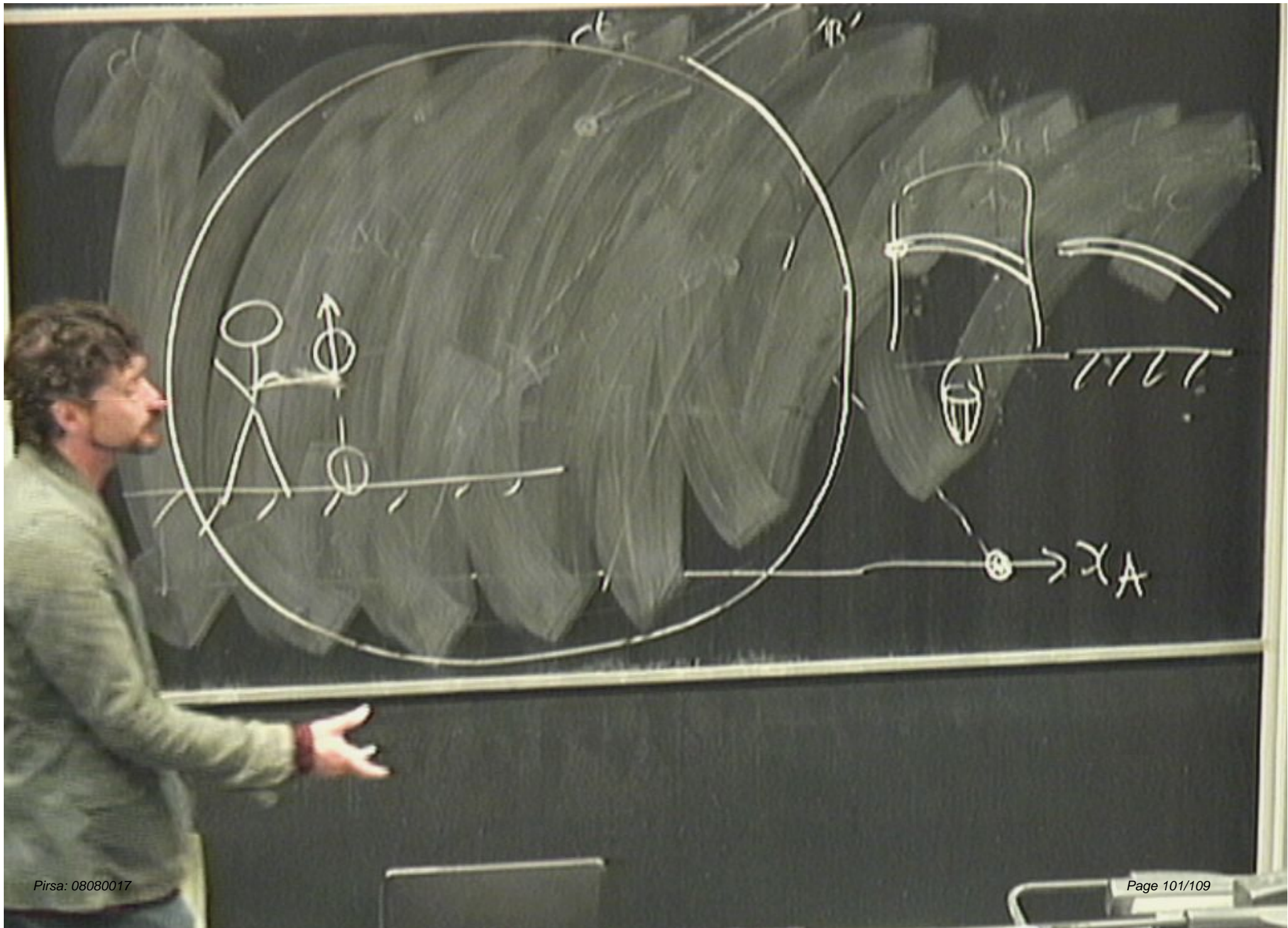


# Einstein's Rotating Disk Thought Expt



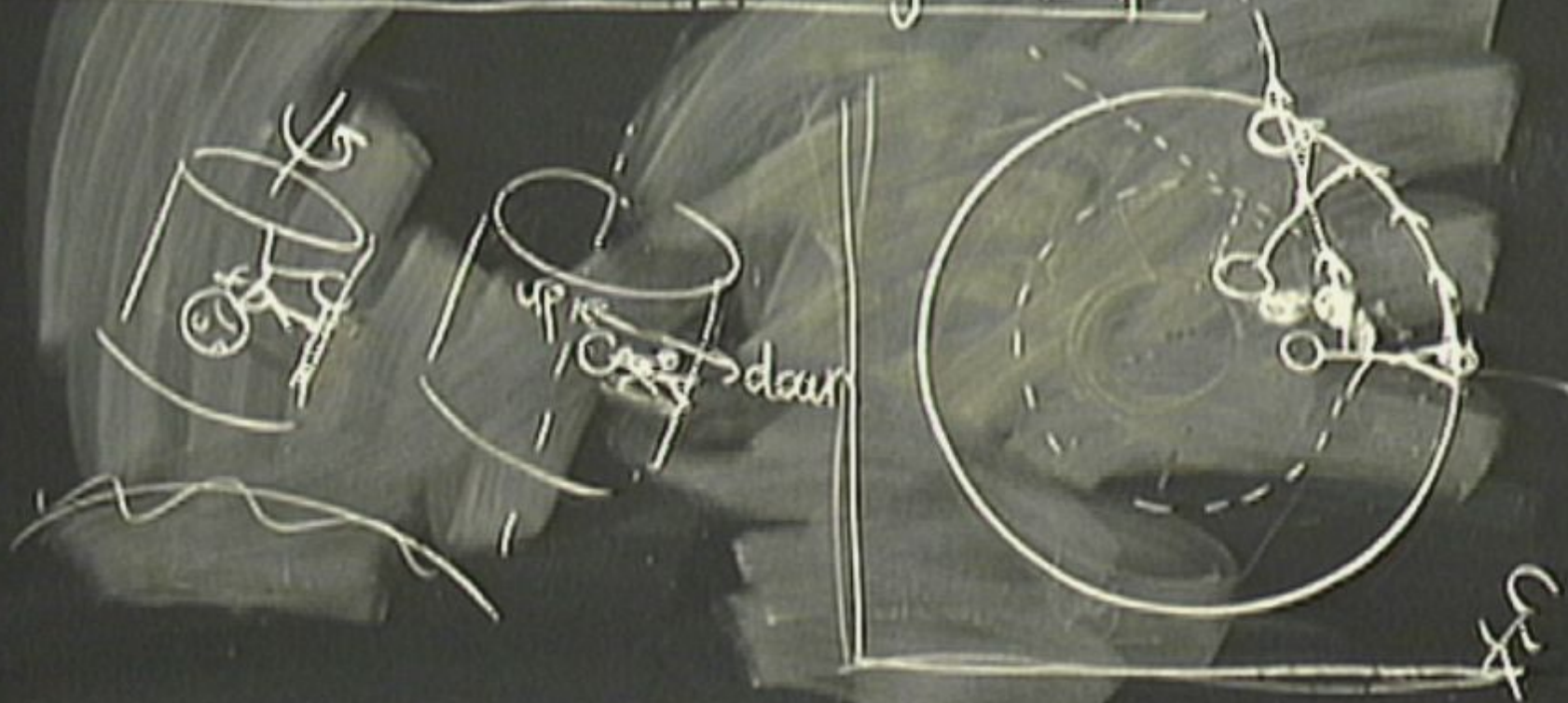


$\otimes \rightarrow \chi_A$

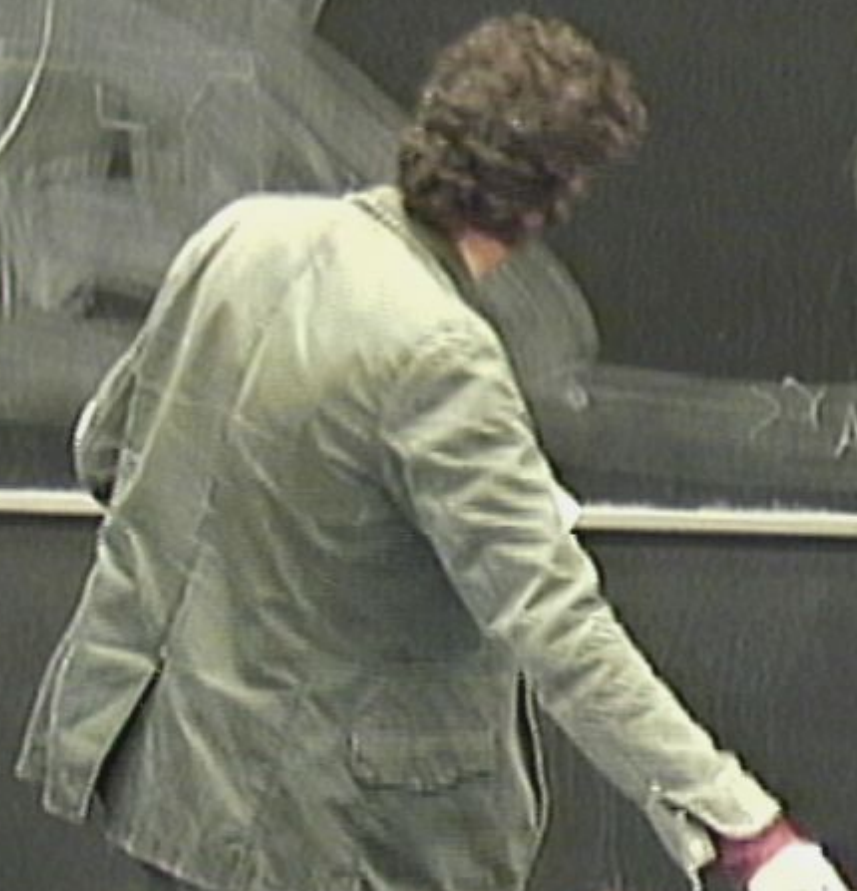




# Einstein's Rotating Disk Thought Expt



# Time Dilation $dt_p$ $dt_m$





# Time Dilation $dt$ $dt'$

$$\gamma = \frac{dt}{dt'}$$



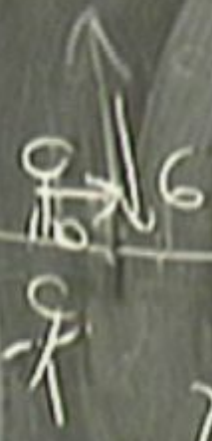
# Time Dilation

$$\Delta t = \gamma \Delta t_0$$



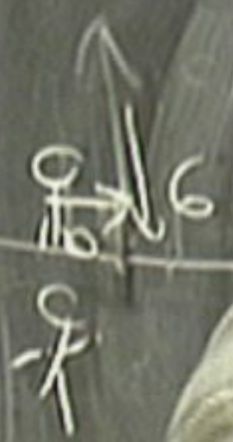
# Time Dilation

$$dt = \gamma dt_0$$



# Time Dilation

$$dt = \gamma dt_0$$



# Time Dilation

$$dt = \gamma dt_0$$

