

Title: Special Relativity 9- Synchronization of Clocks

Date: Aug 12, 2008 09:00 AM

URL: <http://pirsa.org/08080068>

Abstract: A discussion of how to synchronize clocks that are separated in space, and how this leads to the relativity of simultaneity. <br>

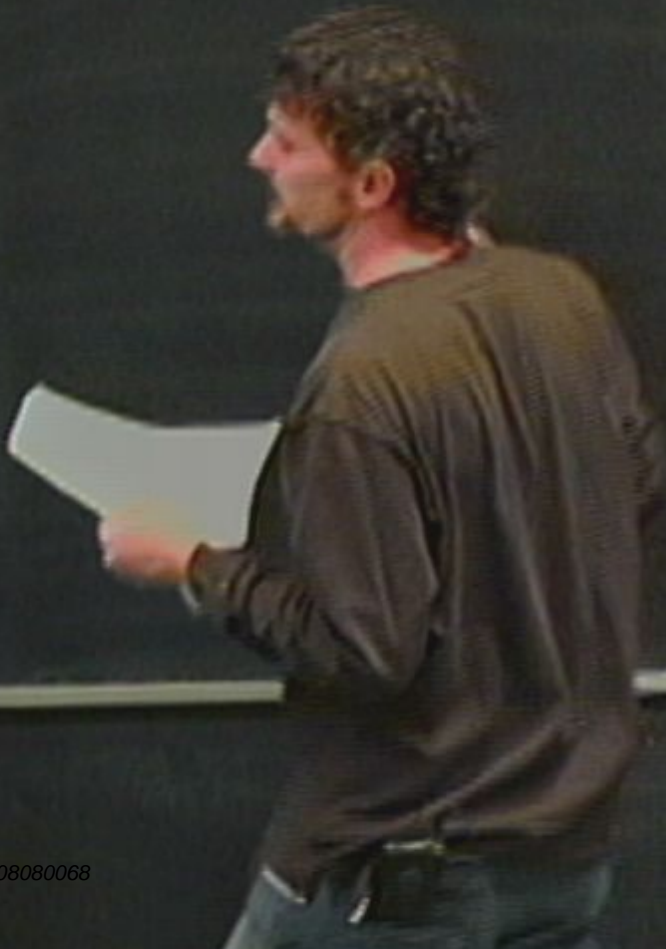
Learning Outcomes: <br>

â€¢ Understanding that clock synchronization is a physical process, and exploring various methods of synchronization using spacetime diagrams.  
<br>

â€¢ How to measure distance with a clock: the concept of radar ranging distance. <br>

â€¢ A profound realization about the nature of spacetime: Events that are simultaneous for one observer might not be simultaneous for another.

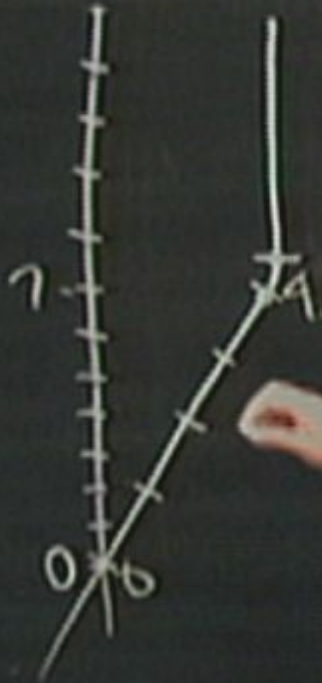
# Synchronizing Clocks.



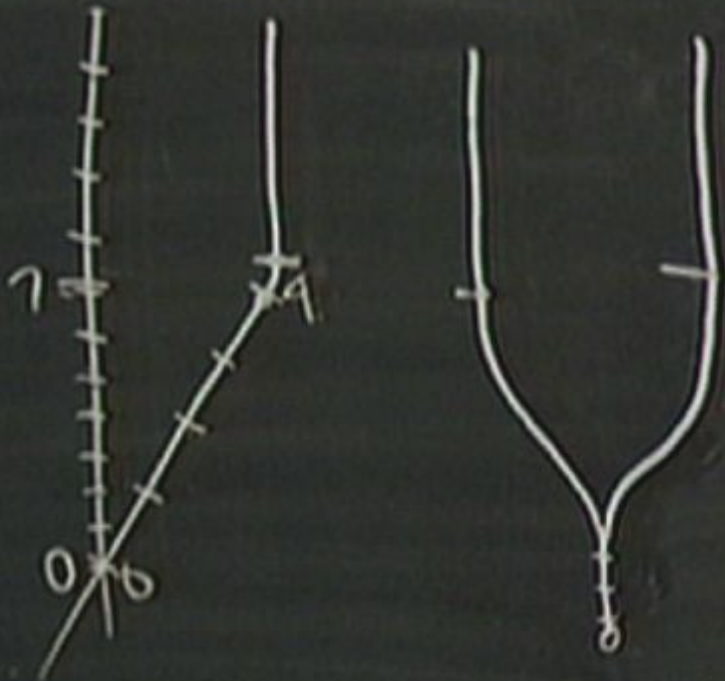
# Synchronizing Clocks



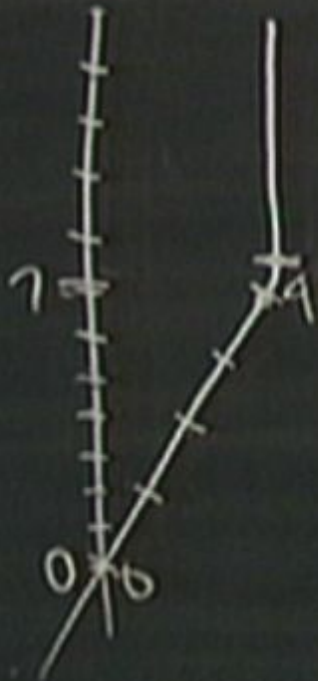
# Synchronizing Clocks



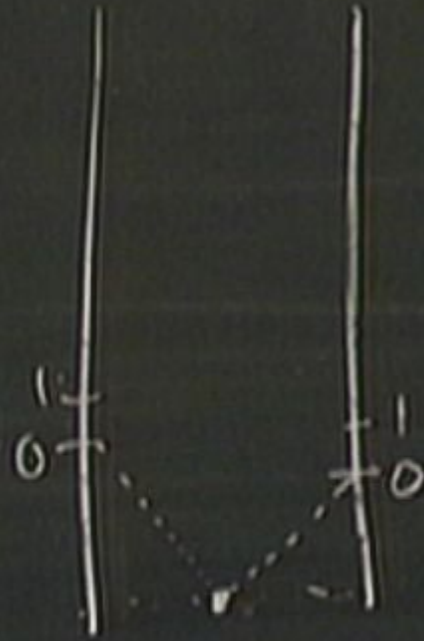
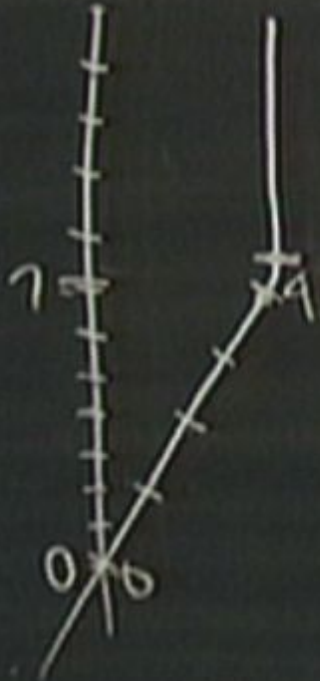
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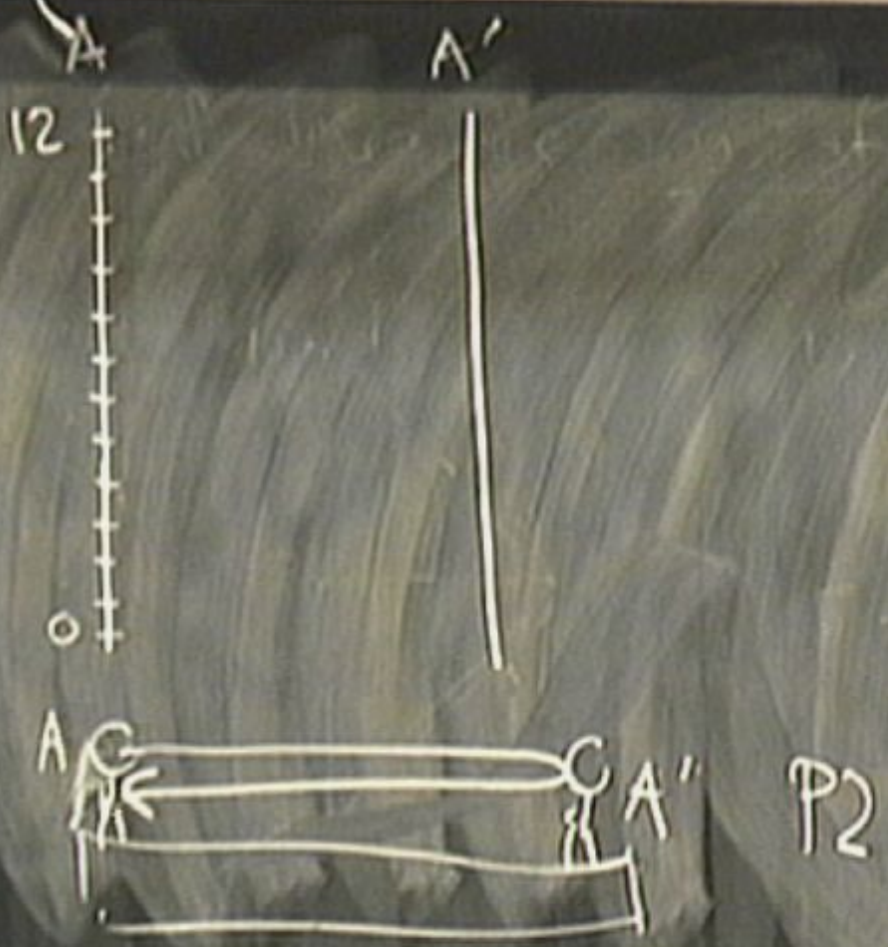
# Synchronizing Clocks.

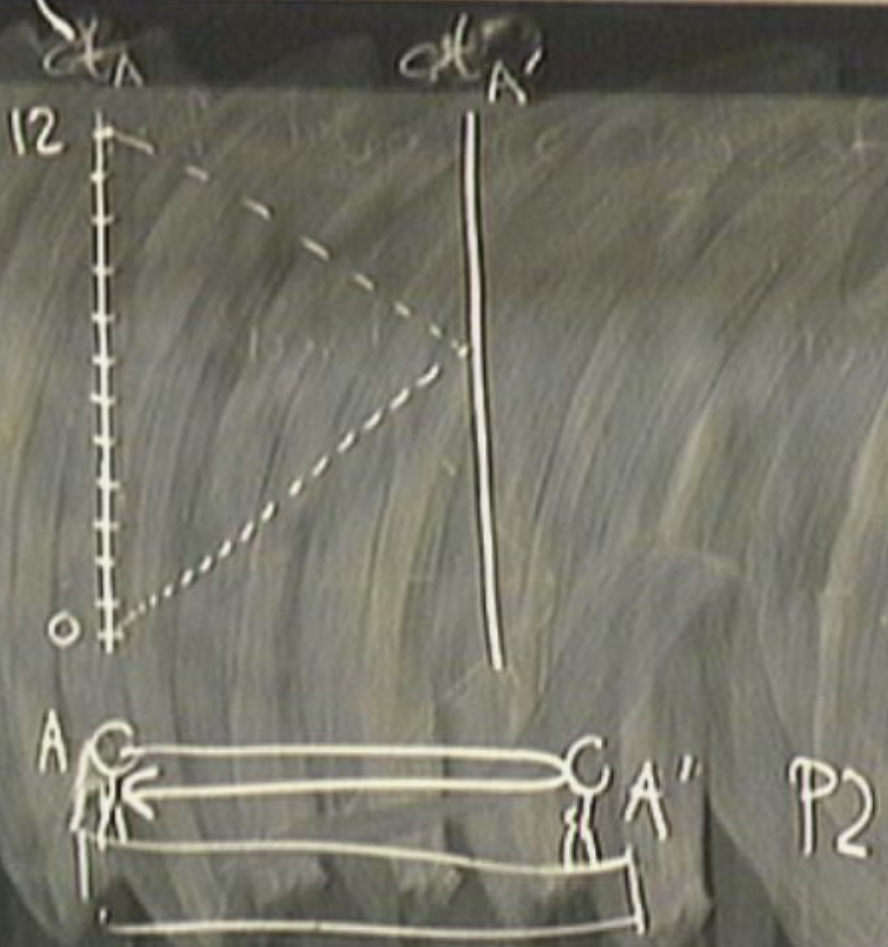






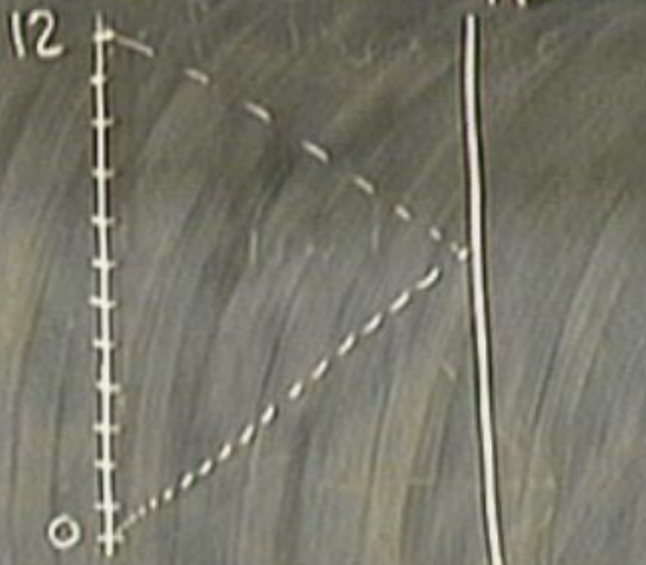




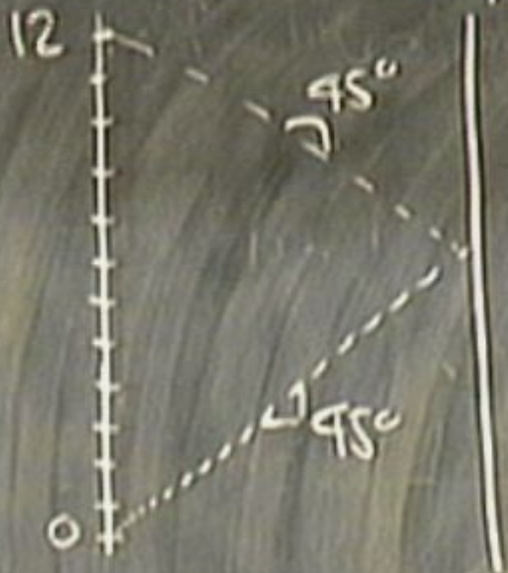


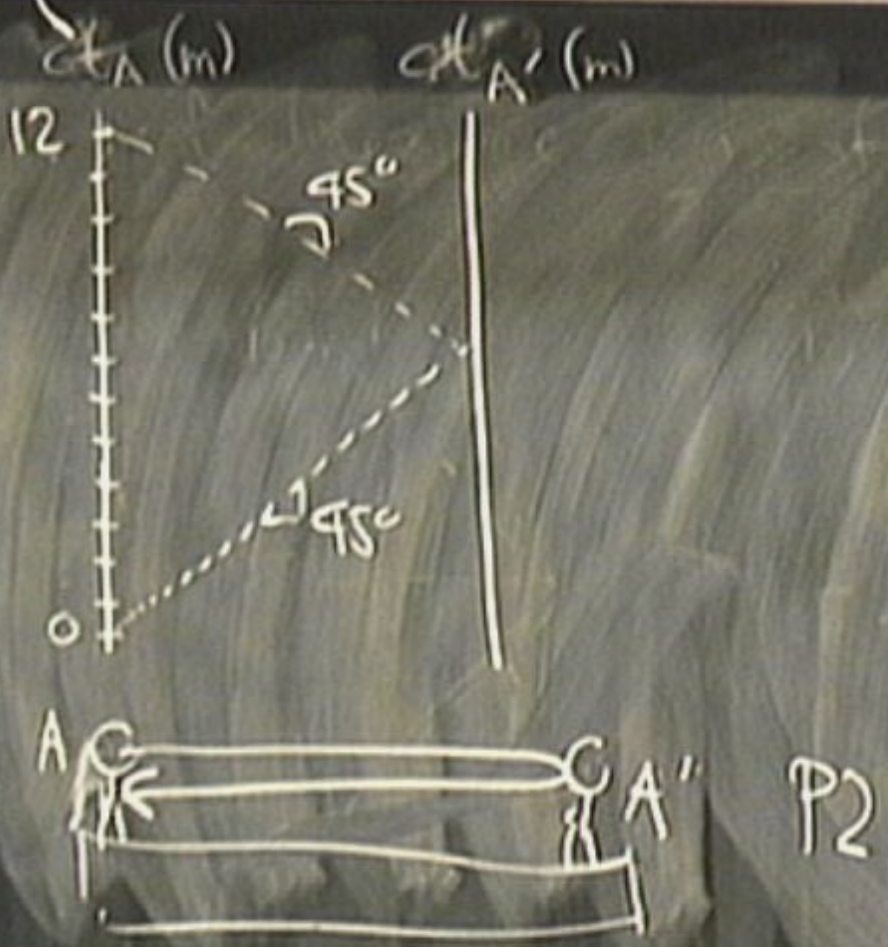
$h_A$  (m)       $h_{A'}$  (m)

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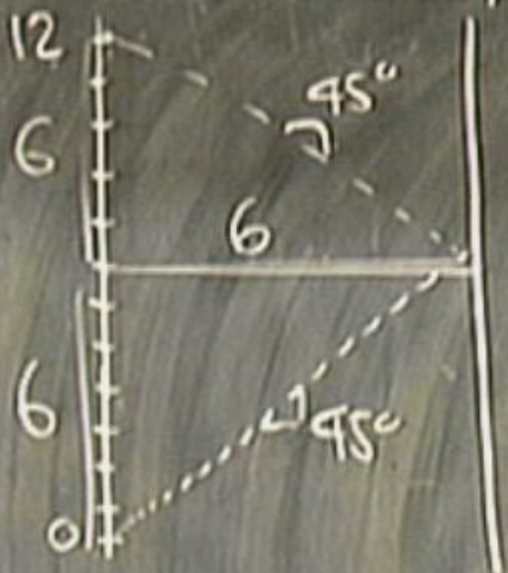


$h_A$  (m)       $h_{A'}$  (m)

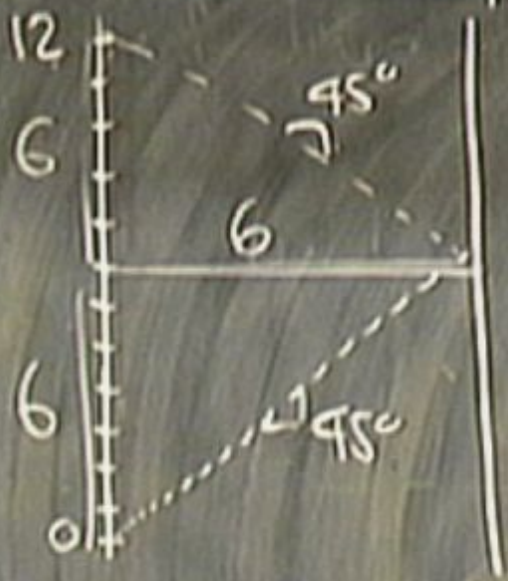




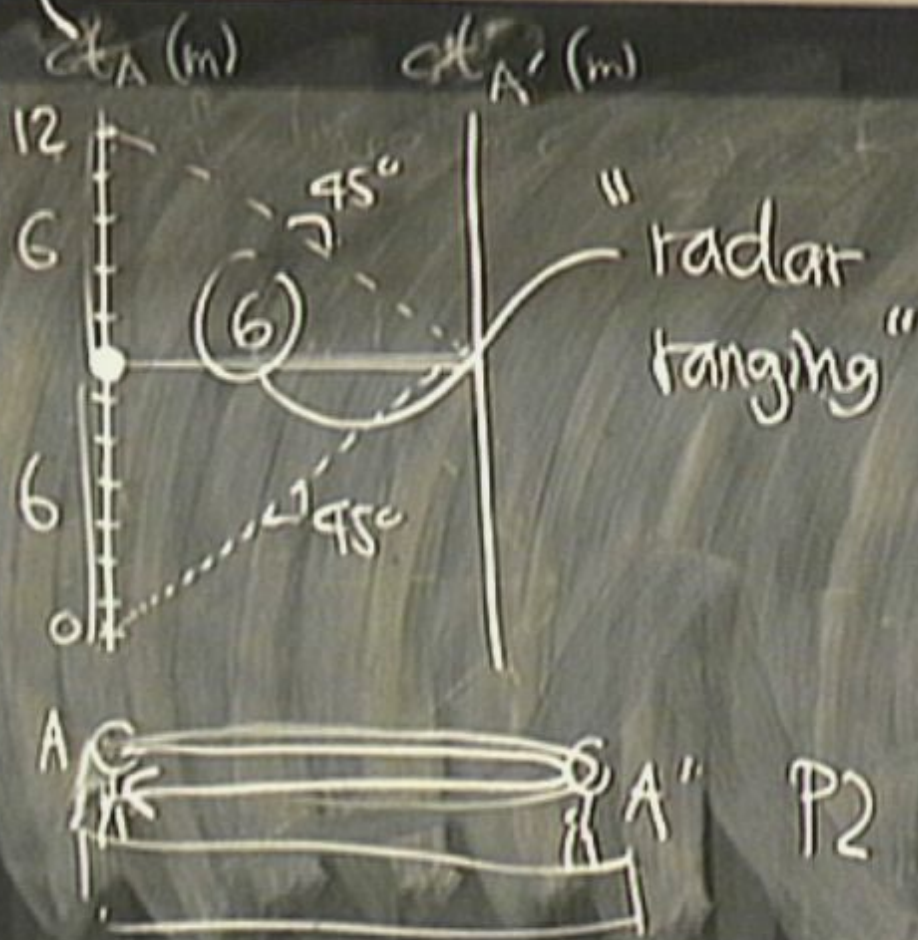
$z_A$  (m)       $z_{A'}$  (m)

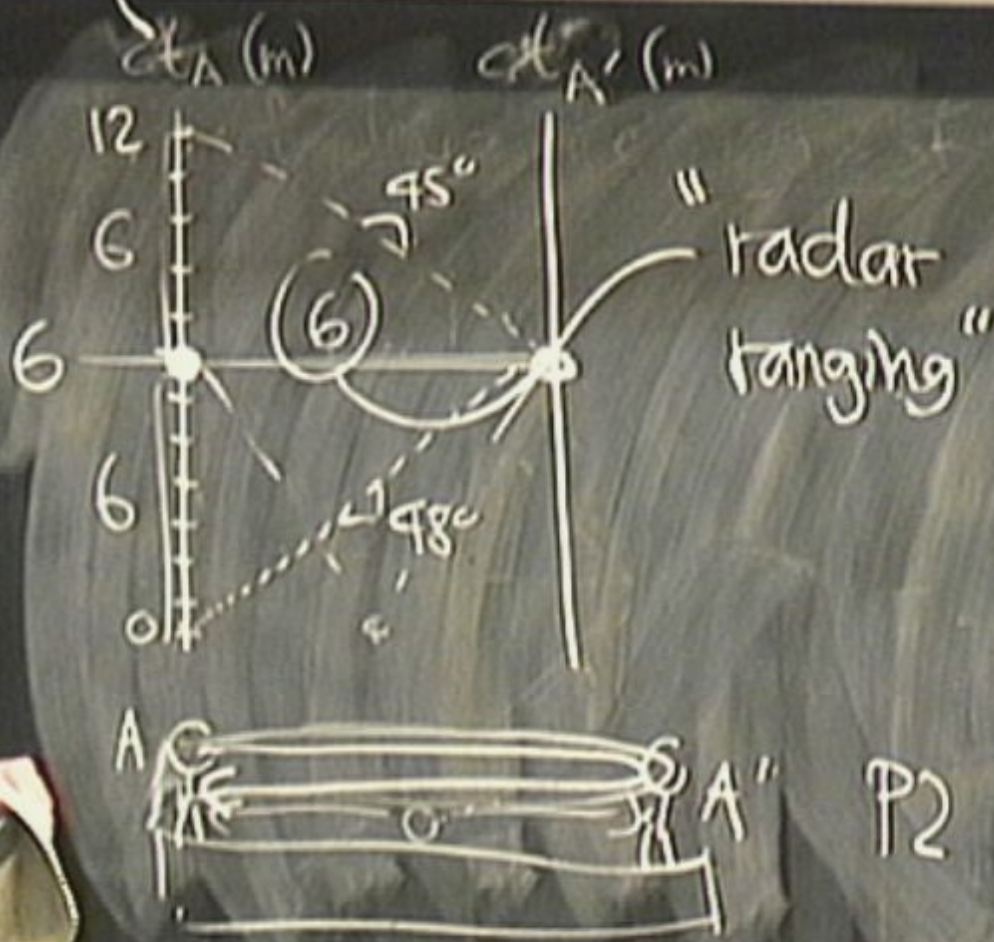


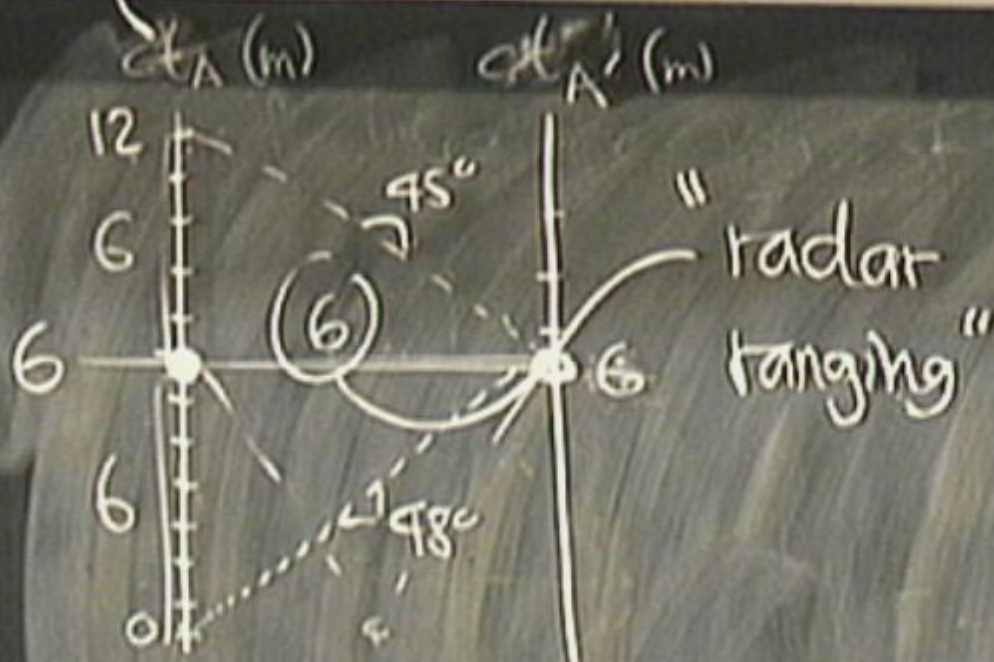
$x_A$  (m)       $x_{A'}$  (m)

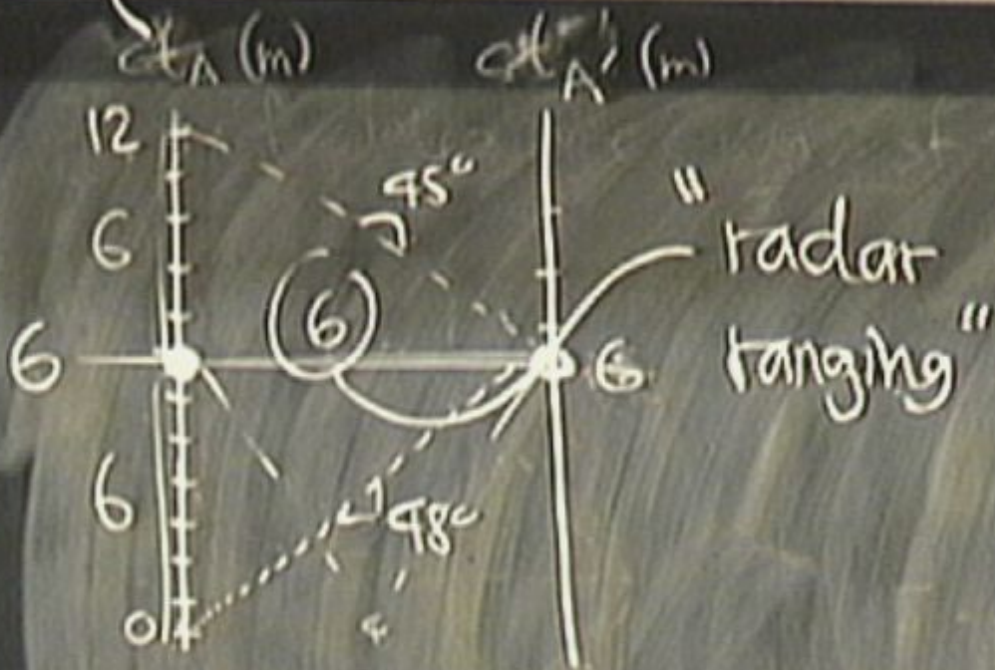




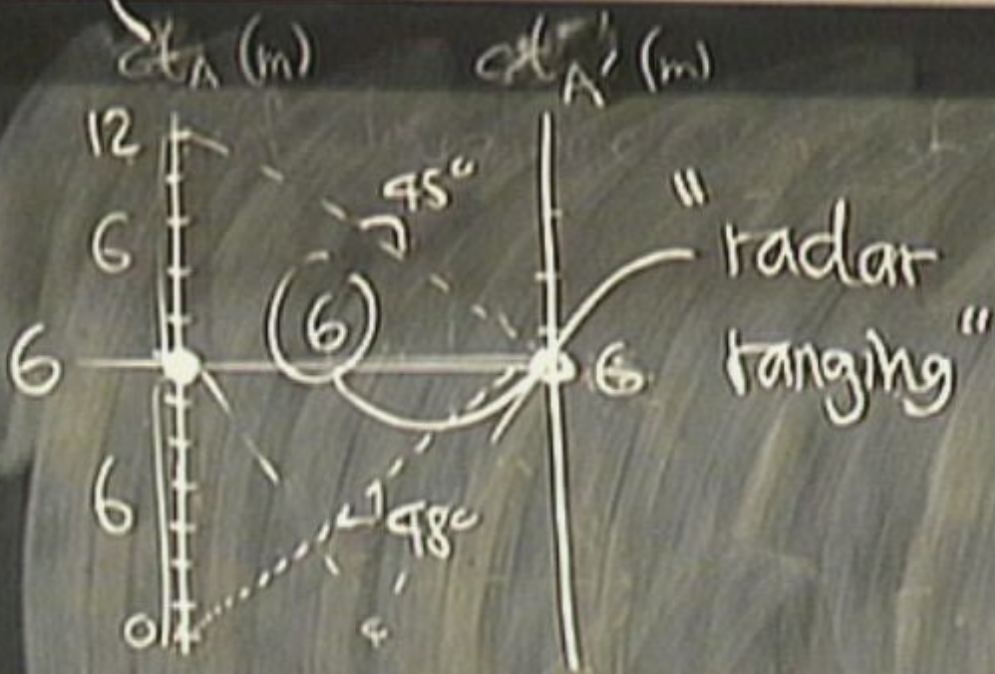








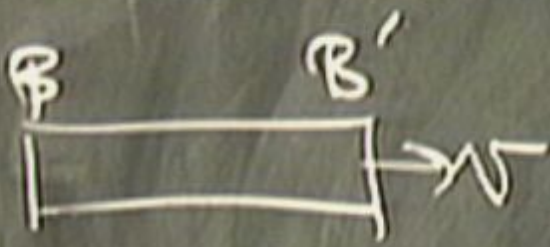




P1 equally entitled  $\rightarrow$  at rest

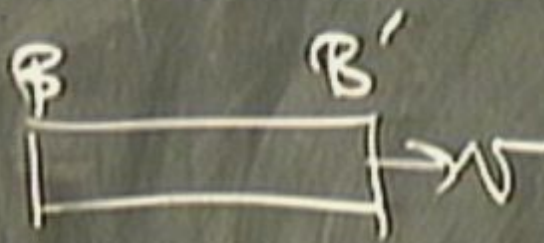
P2 speed =  $c$  indep of source motion







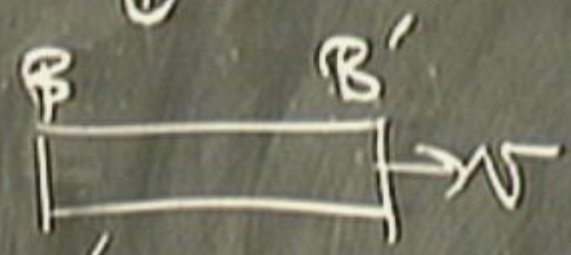
"AA' space"



"AA' space"



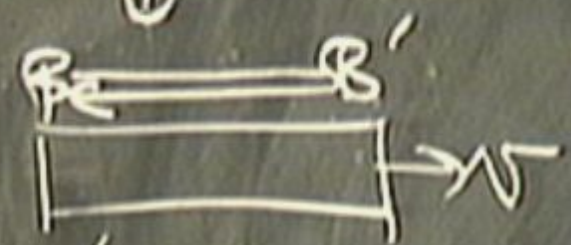
BB' space



"AA' space"



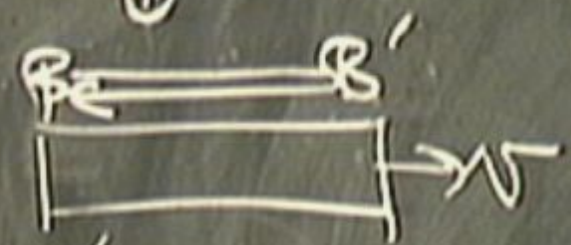
BB' space



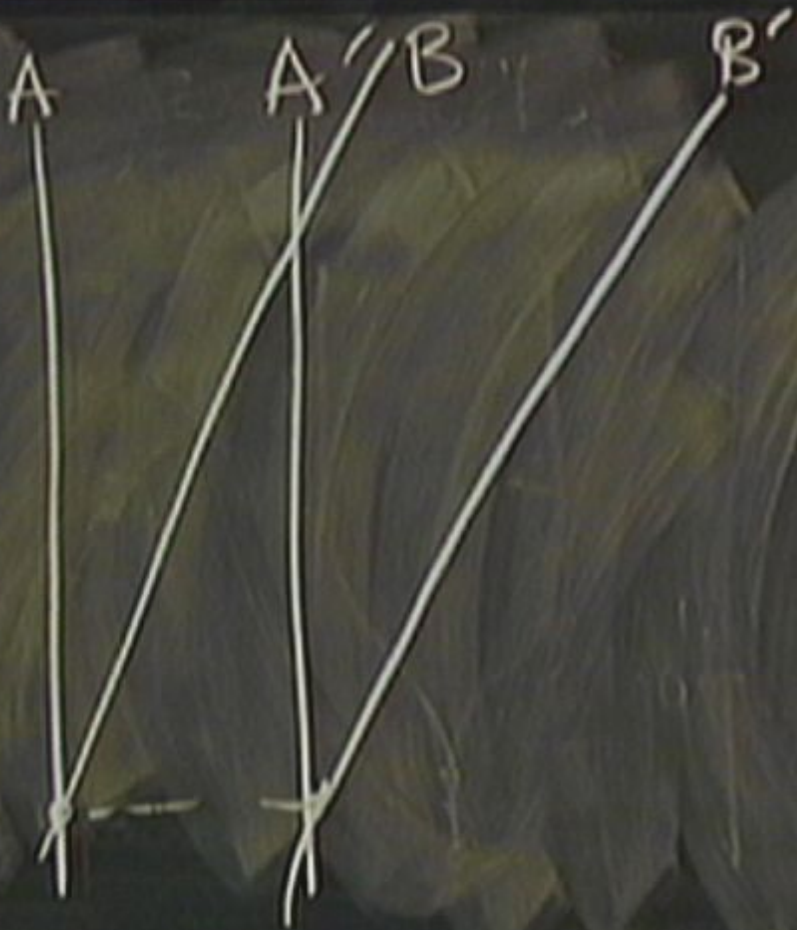
"AA' space"

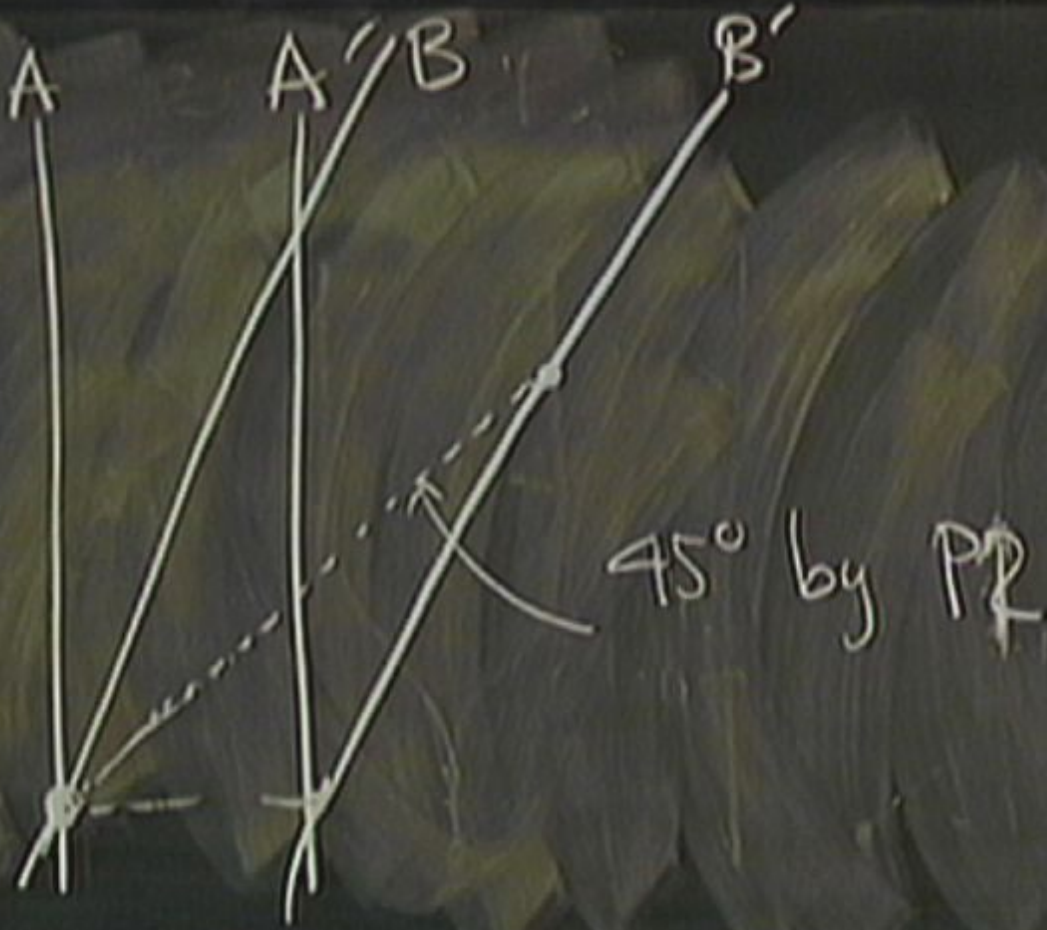


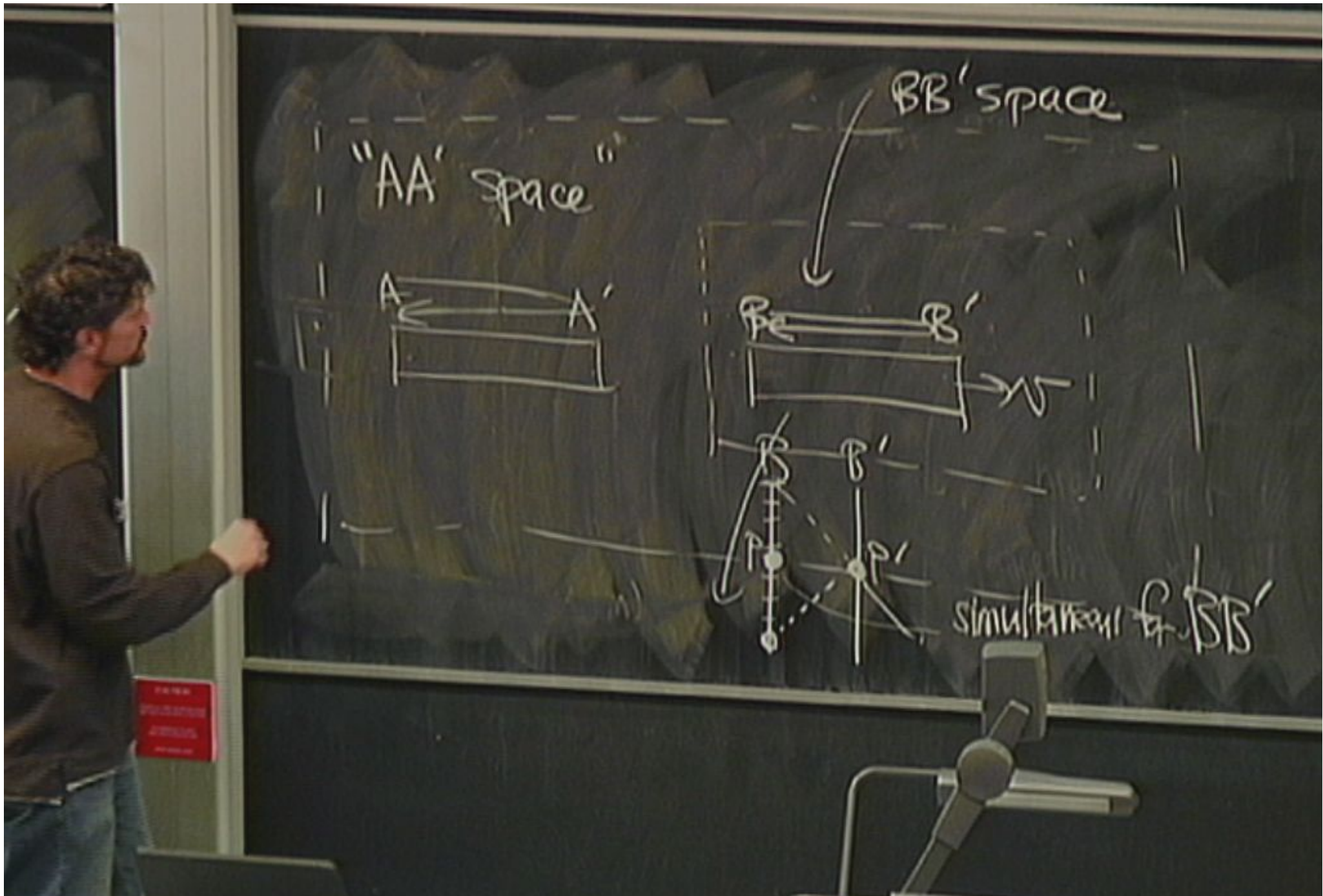
BB' space



simultaneous for BB'





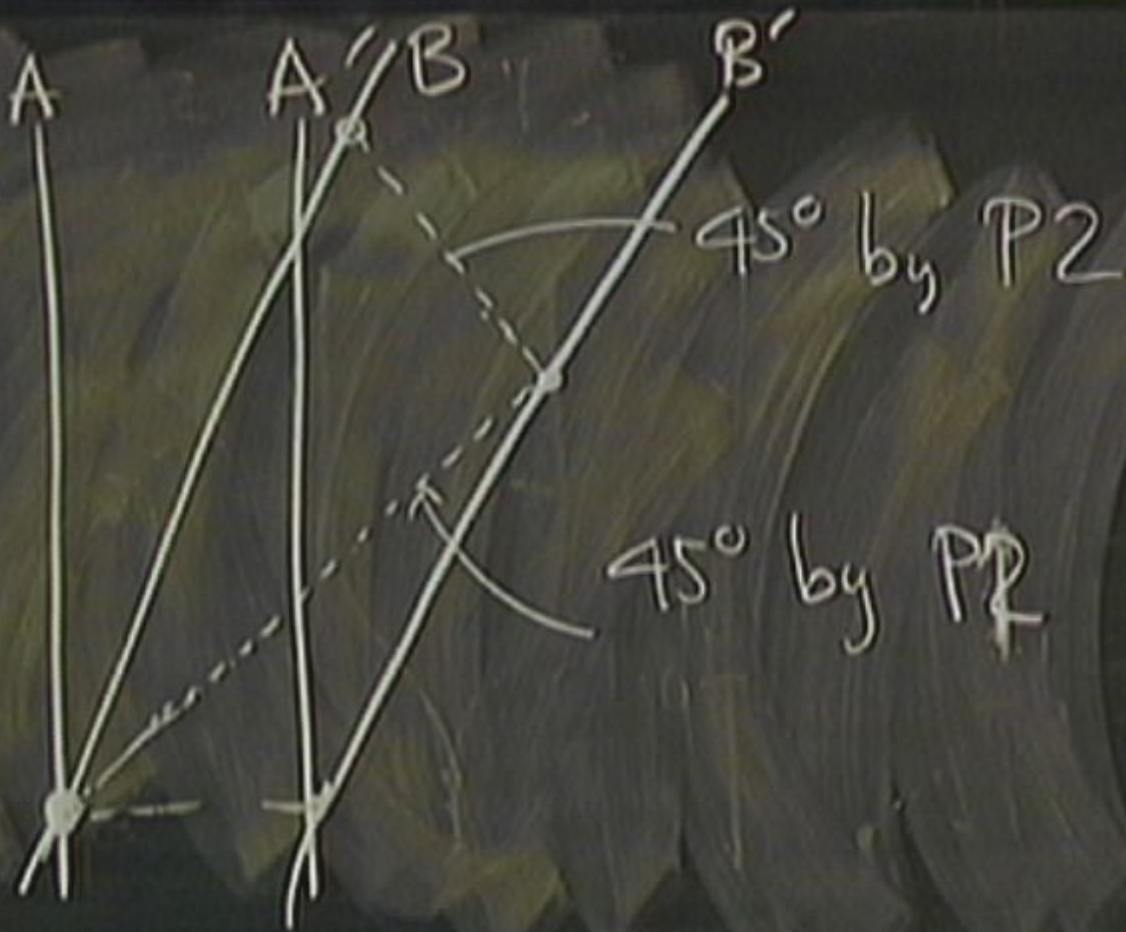


"AA" space

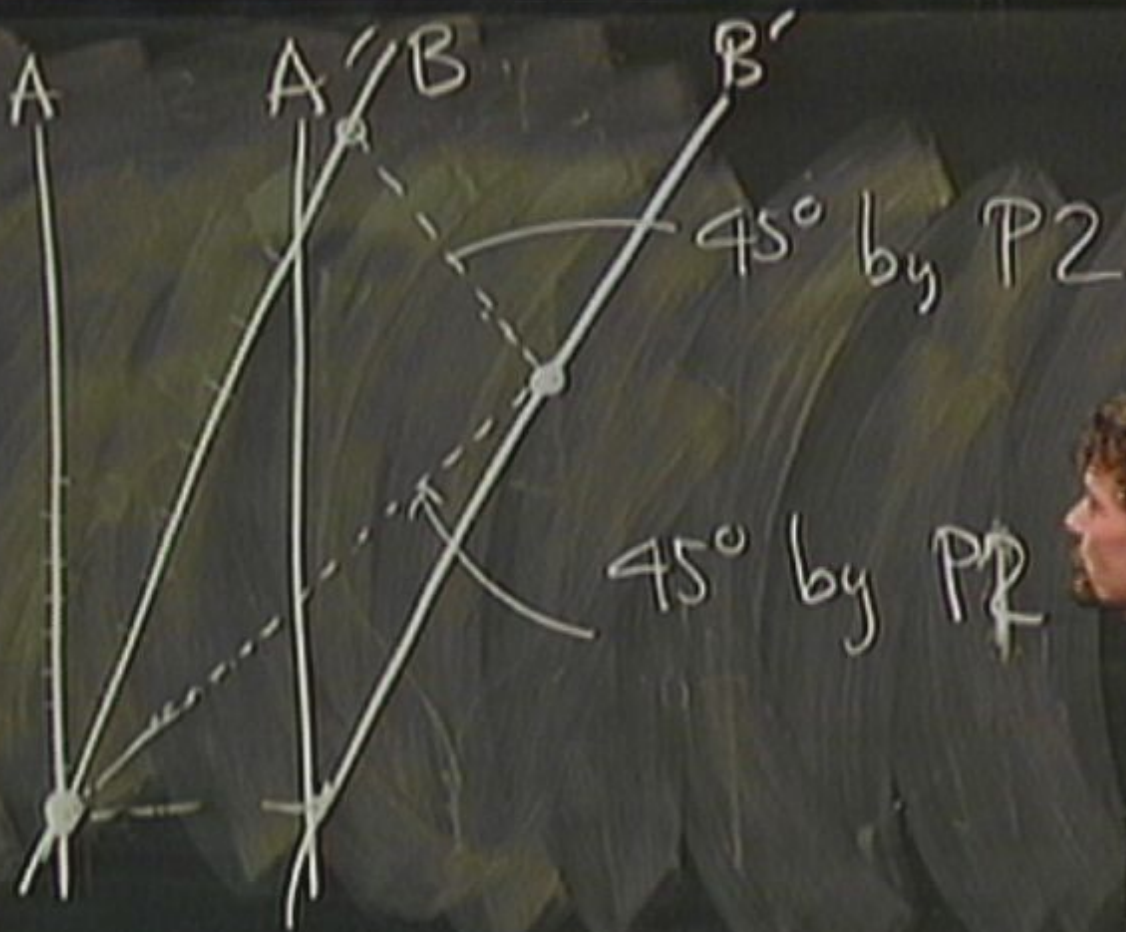
BB' space

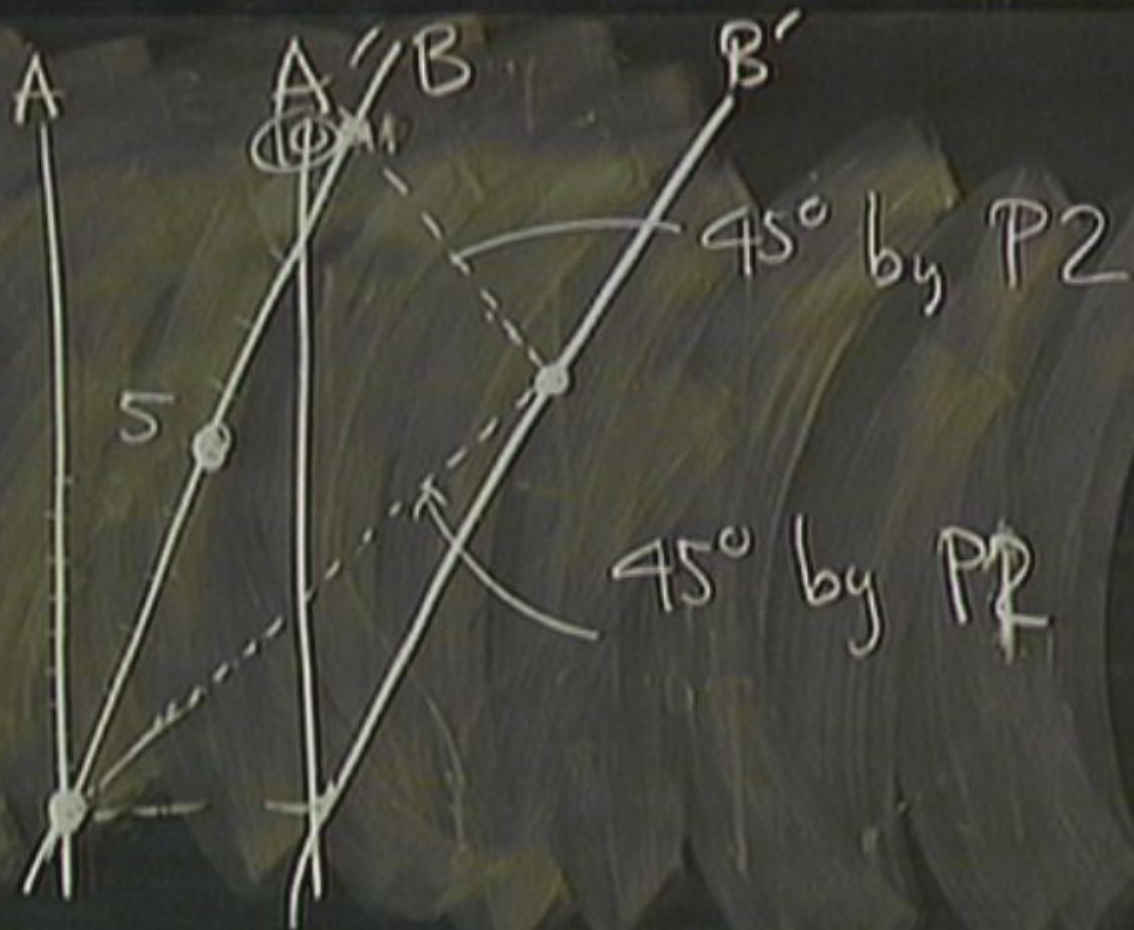


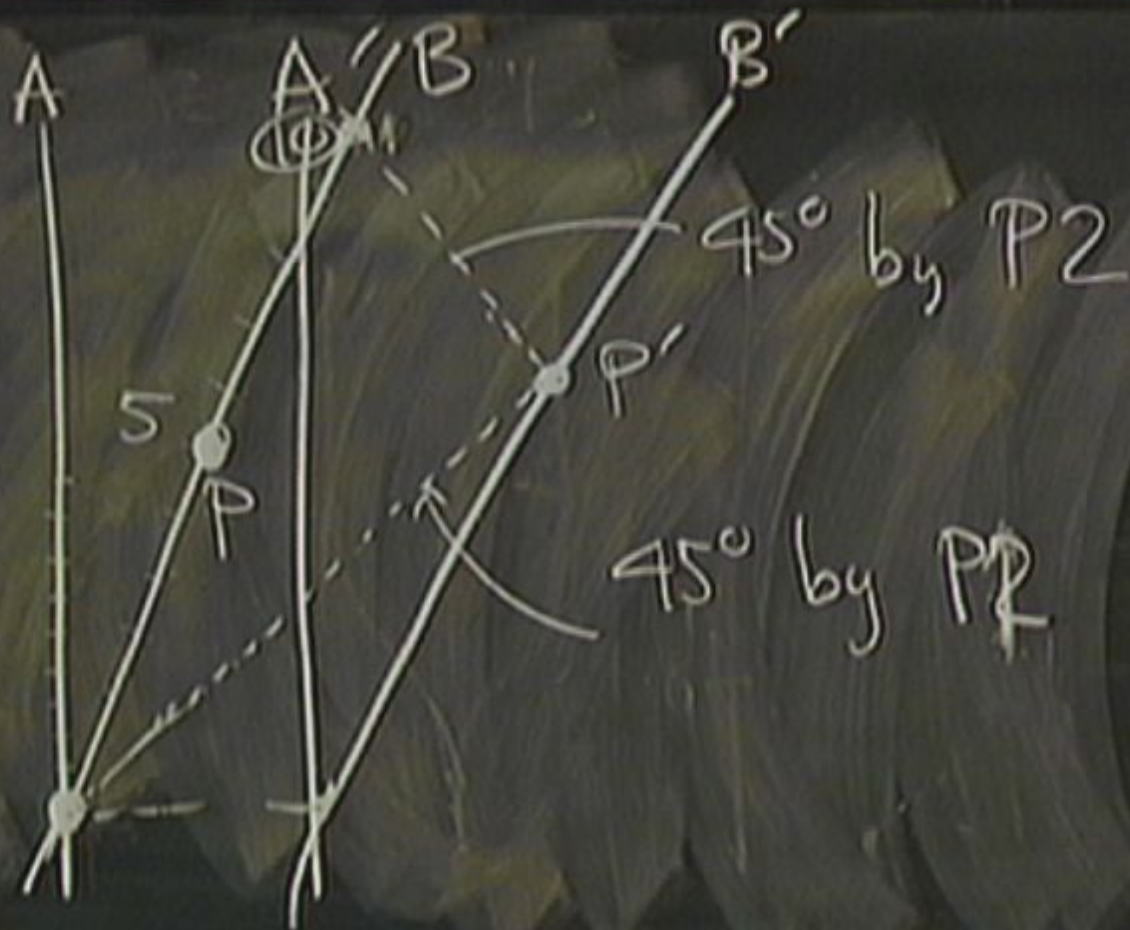
simultaneous in BB'

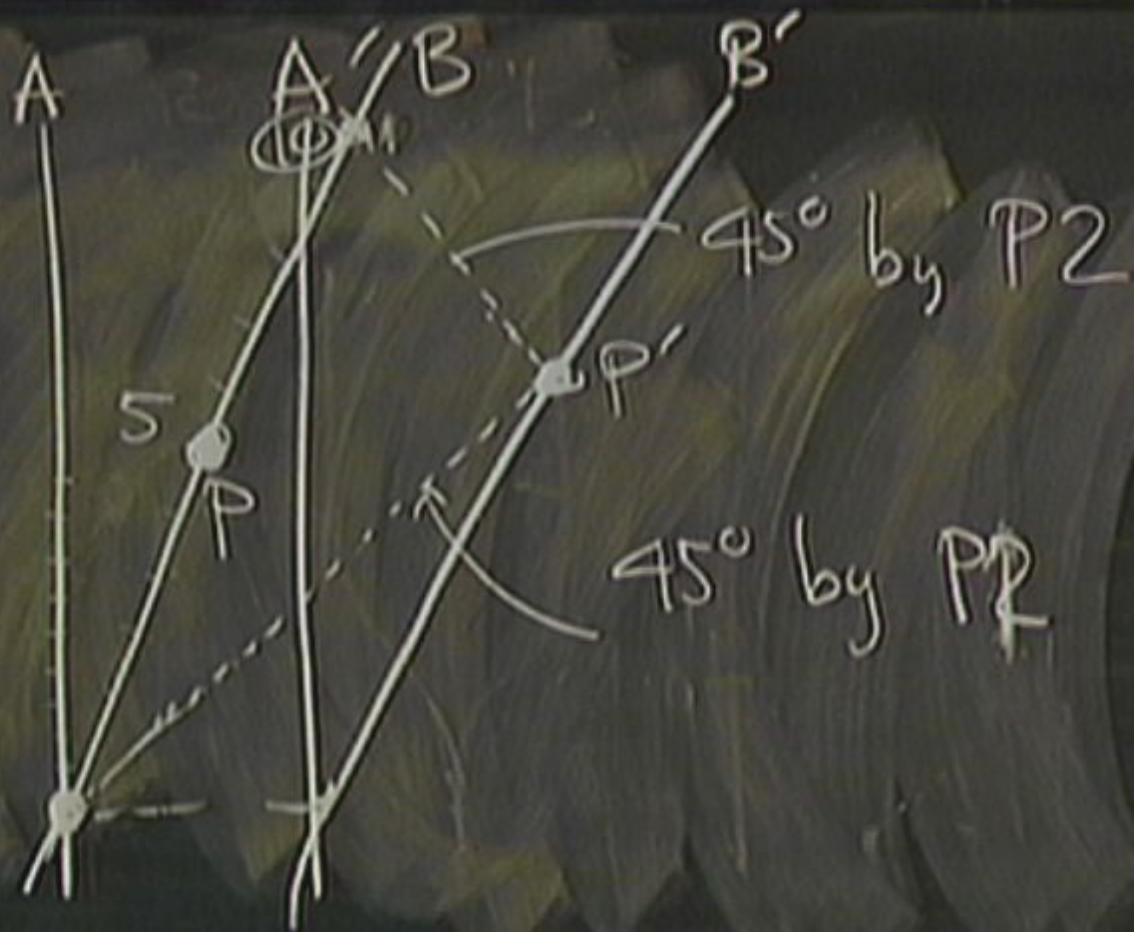


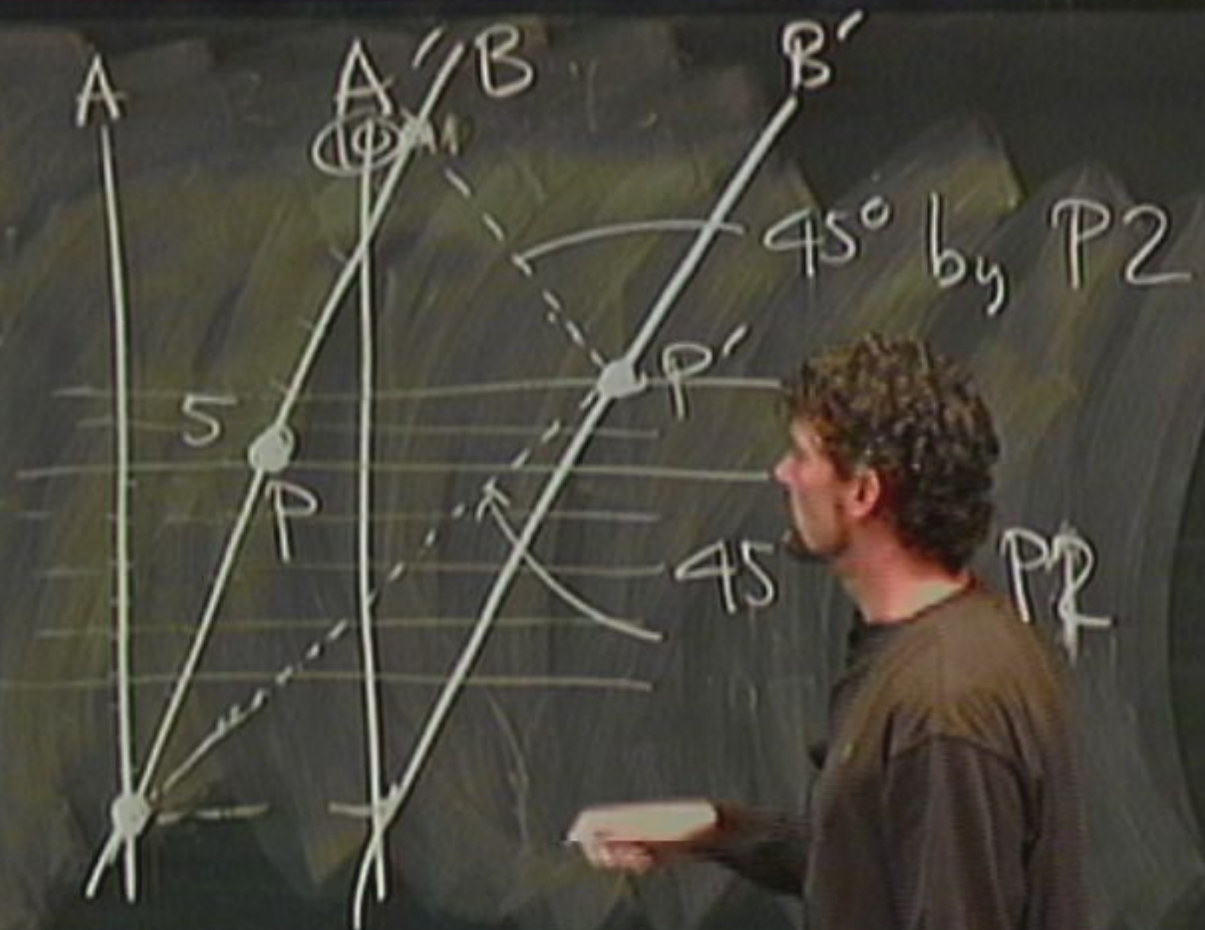


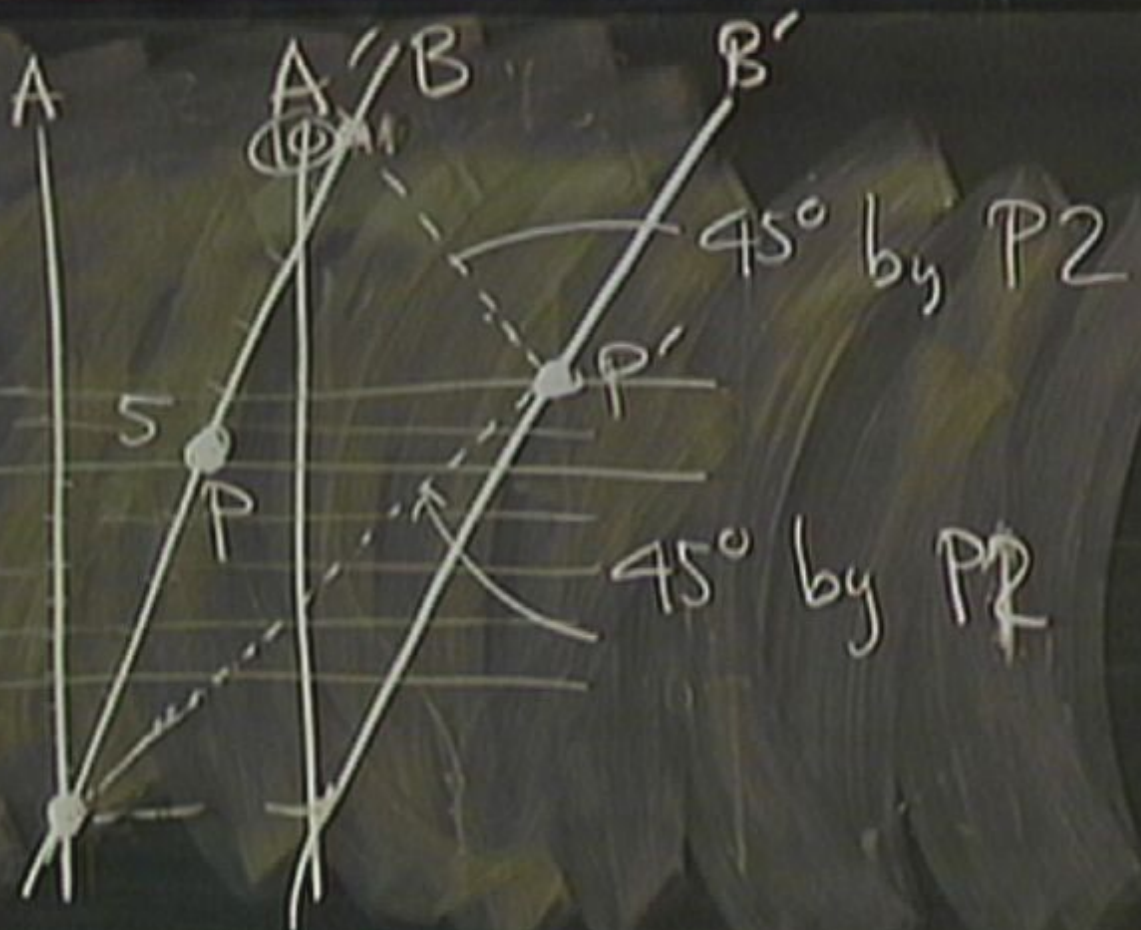


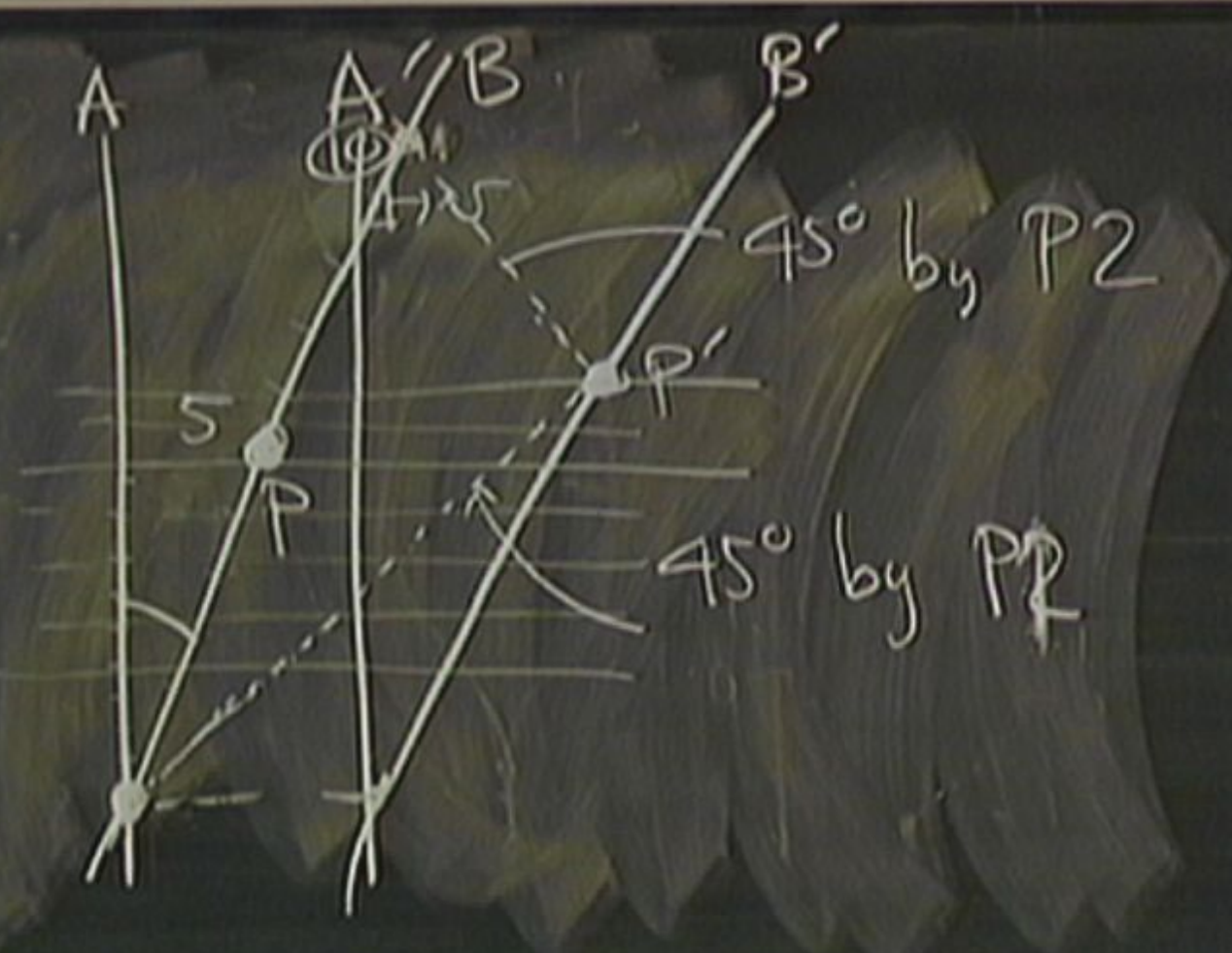








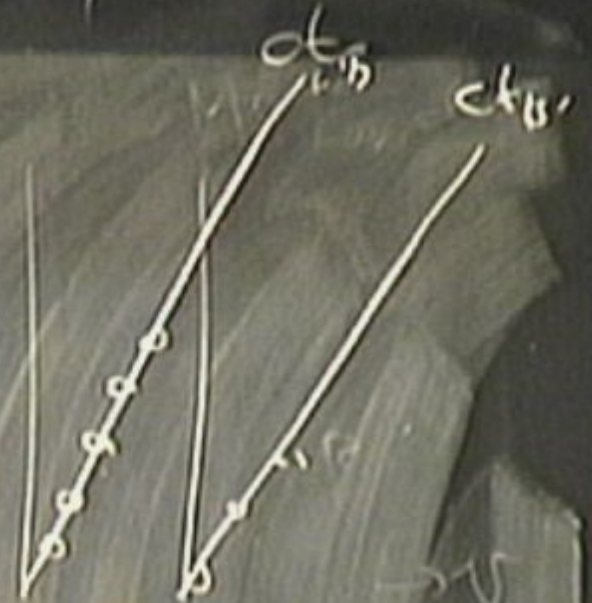




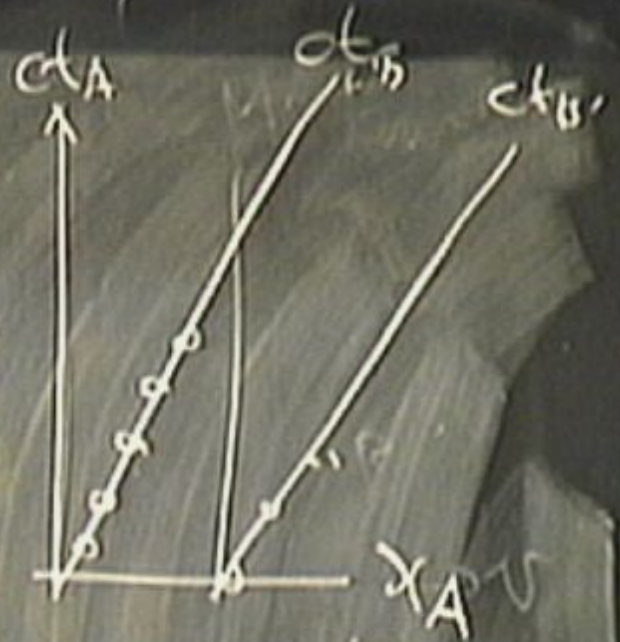
Bob's  $x = Ax + B$



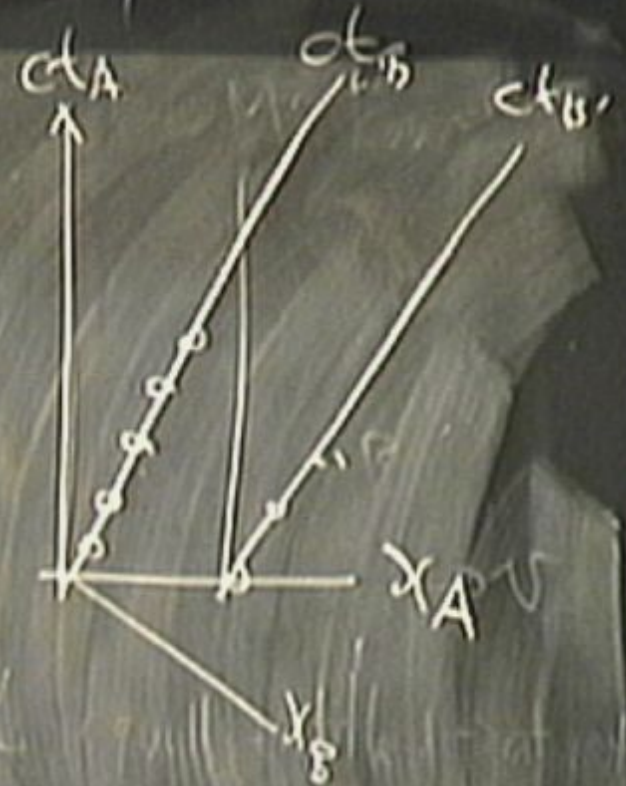
Bob's  $x$ -Axis



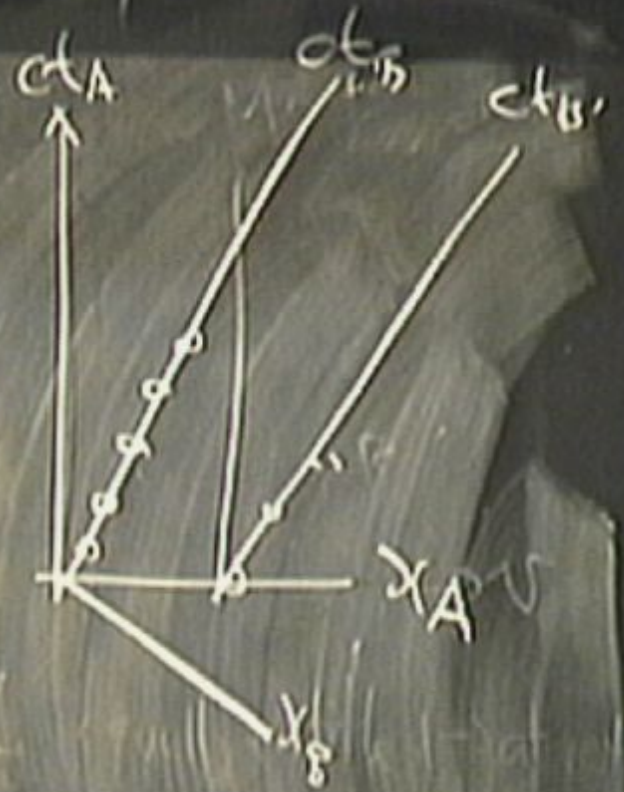
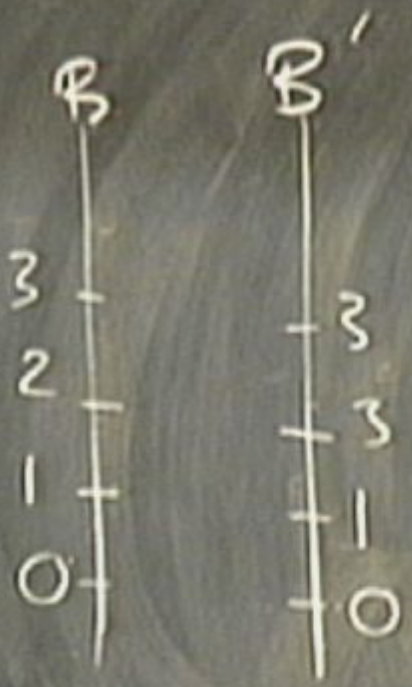
Bob's  $x$ -Axis B



Bob's  $x$ -Axis



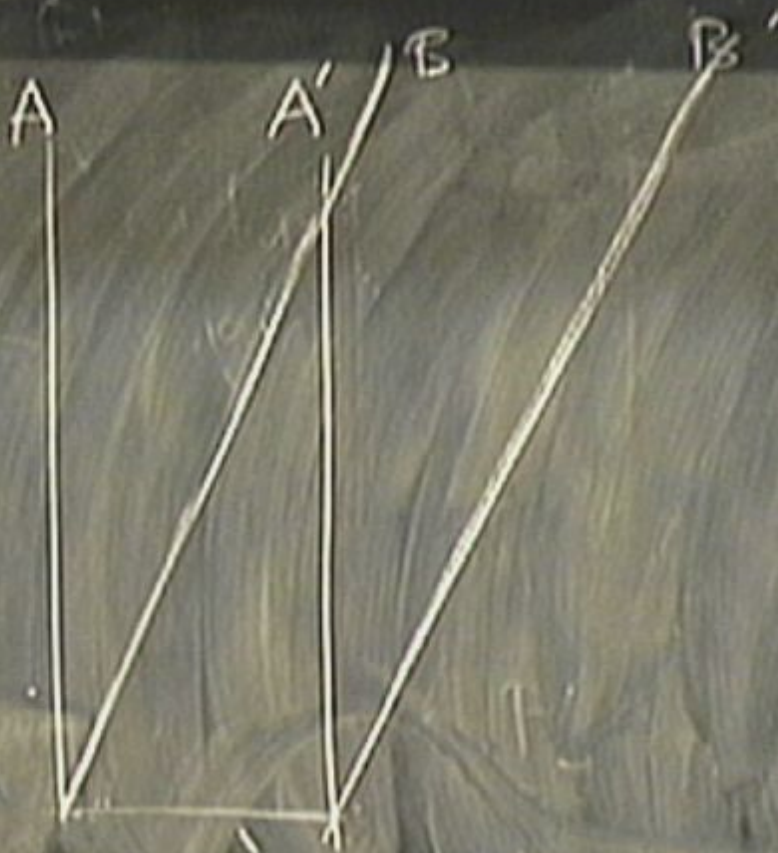
Bob's  $x$ -Axis

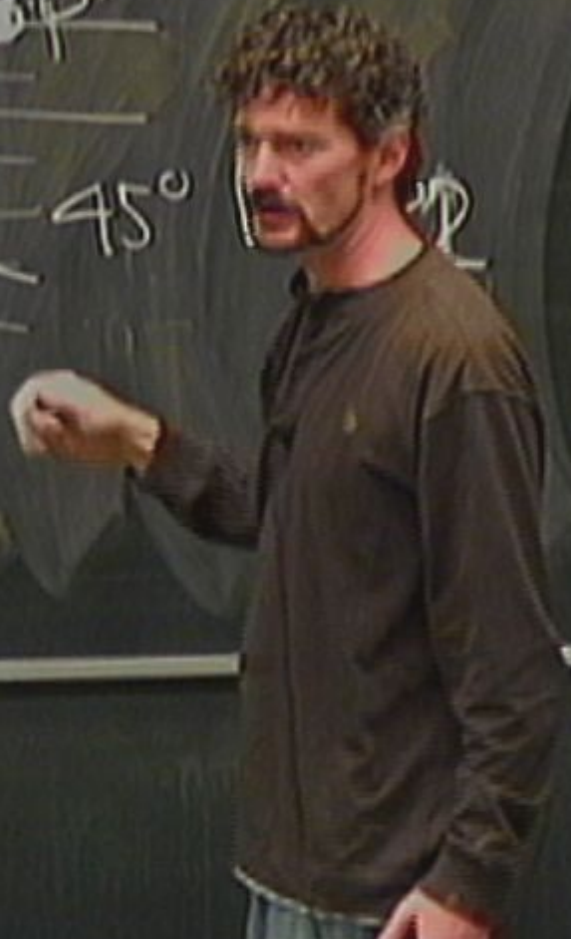
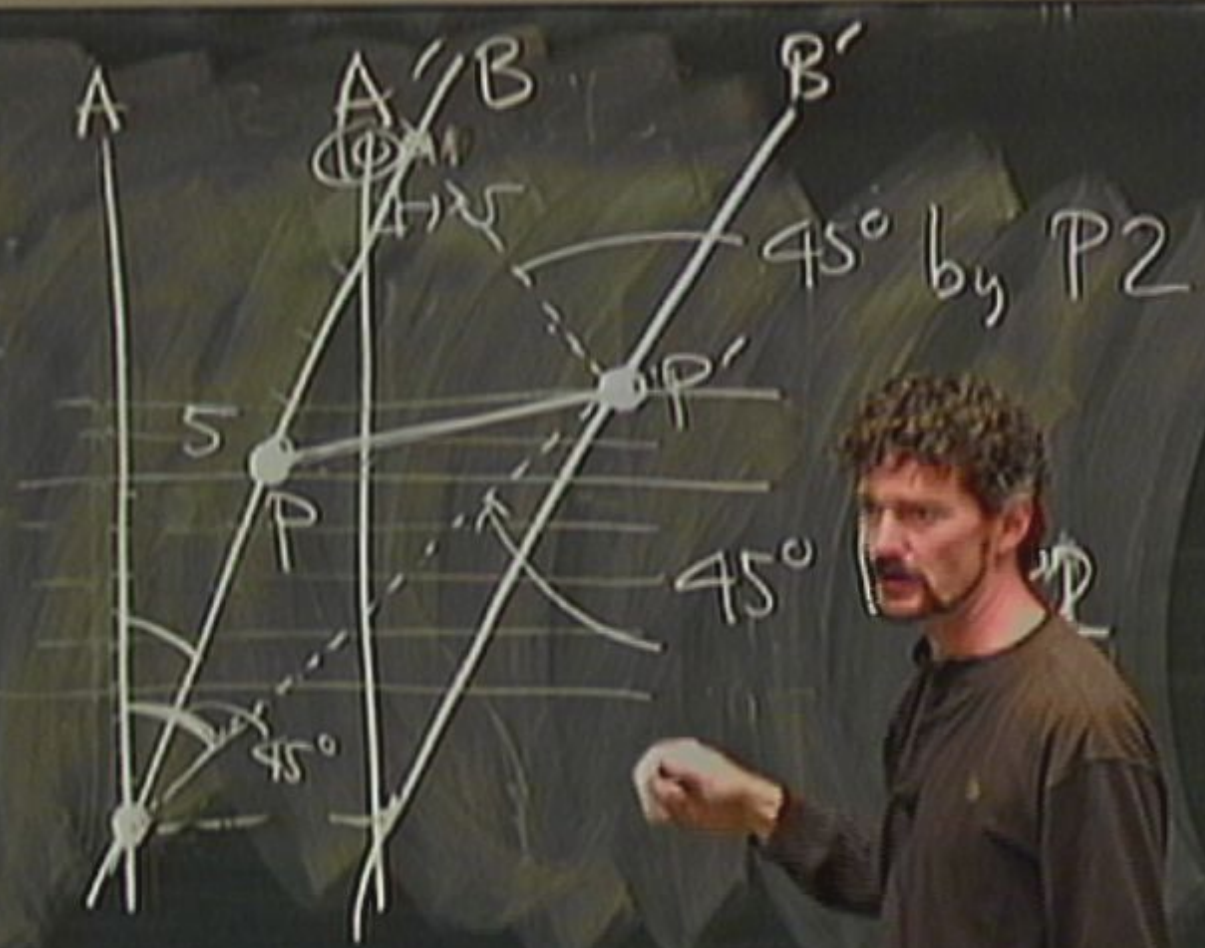


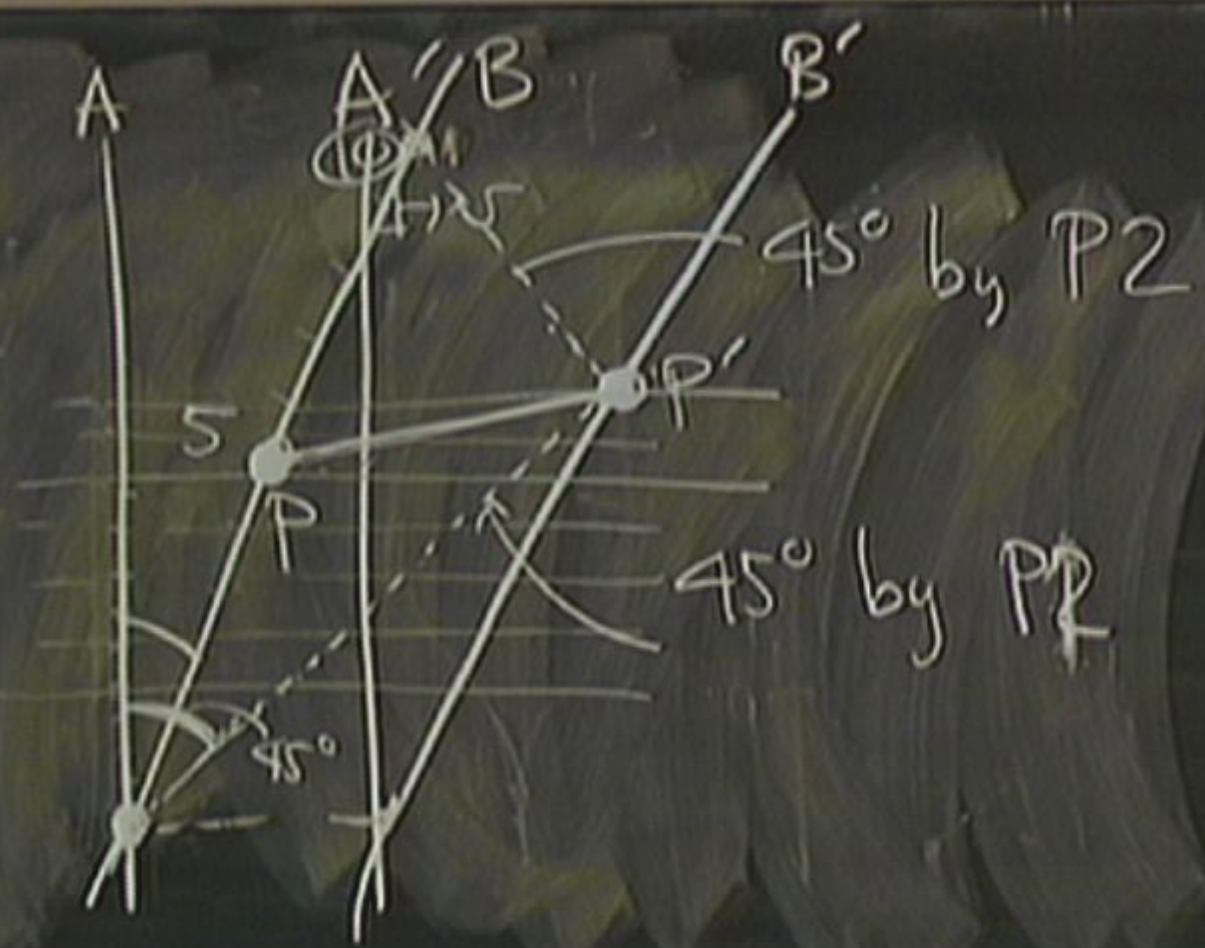
Bob's  $x$ - $A$  $x$  $B$



Bob's  $x-AxB$

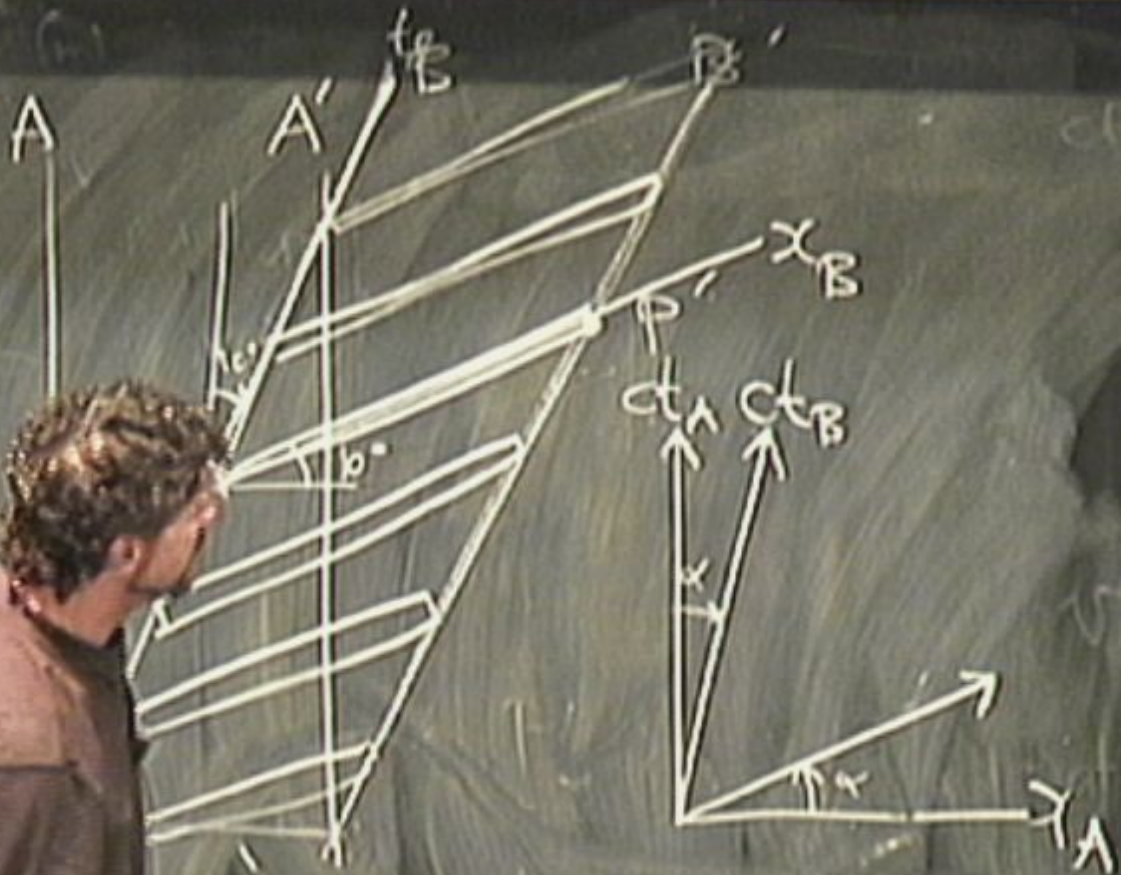
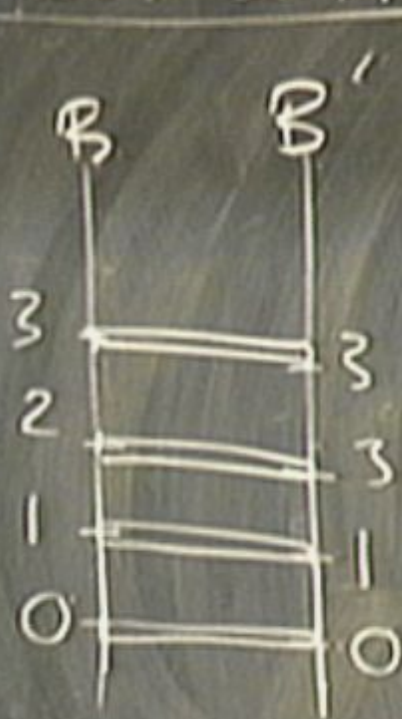




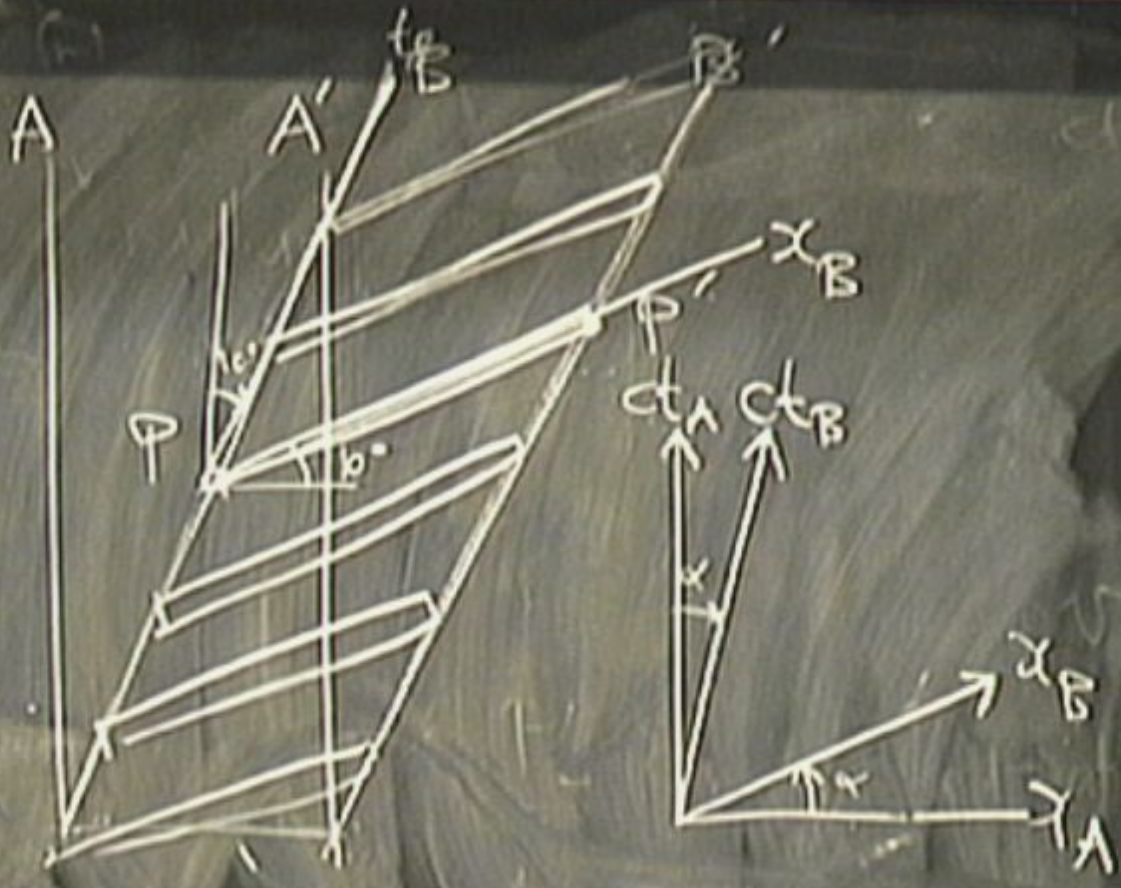
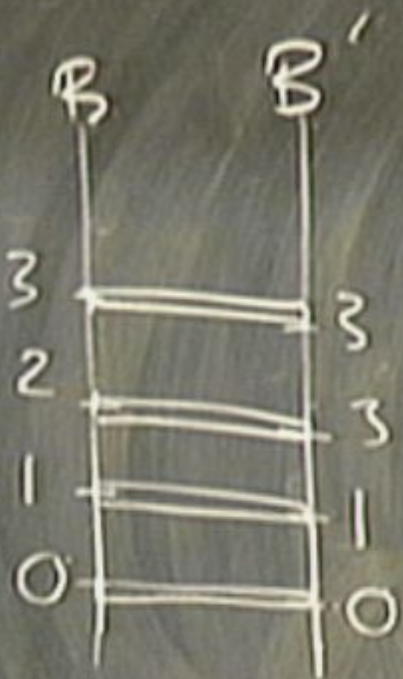


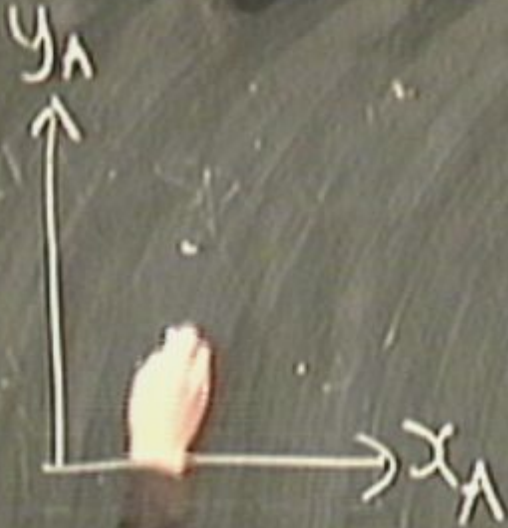


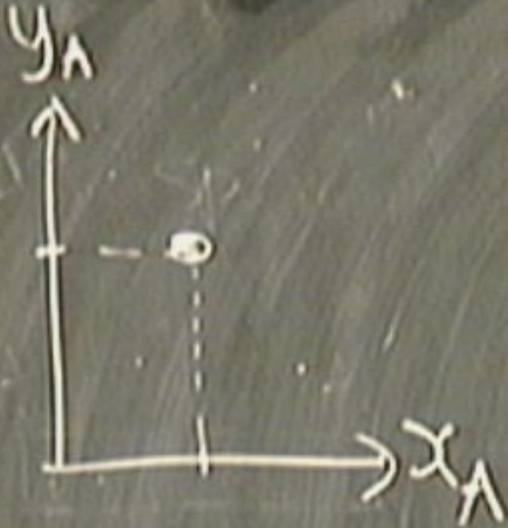
Bob's  $x$ - $A \times B$

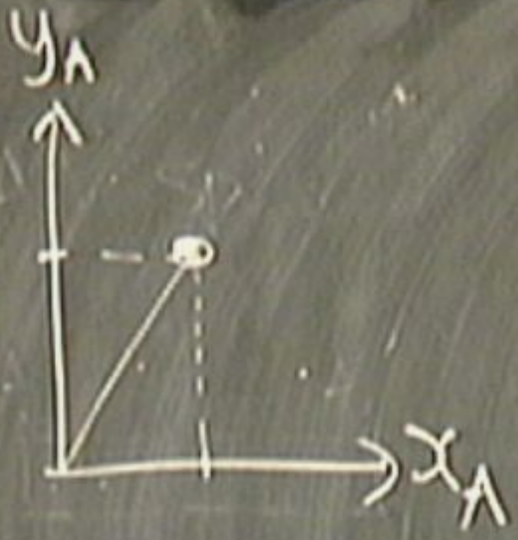


Bob's  $x$ - $Ax$  $B$



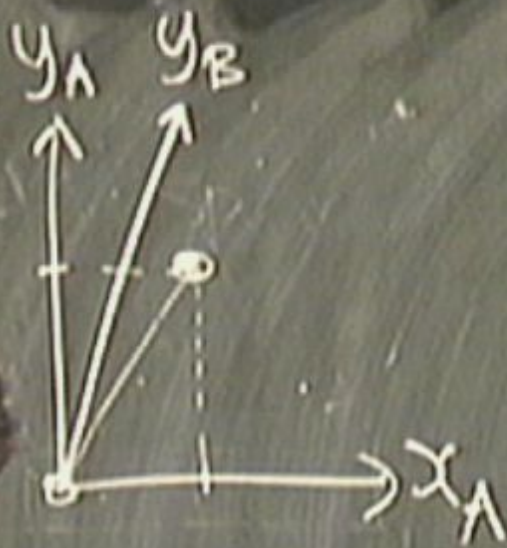






BE SPACE

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RT ST CE







