Title: Concluding Remarks

Date: Jun 24, 2011 03:50 PM

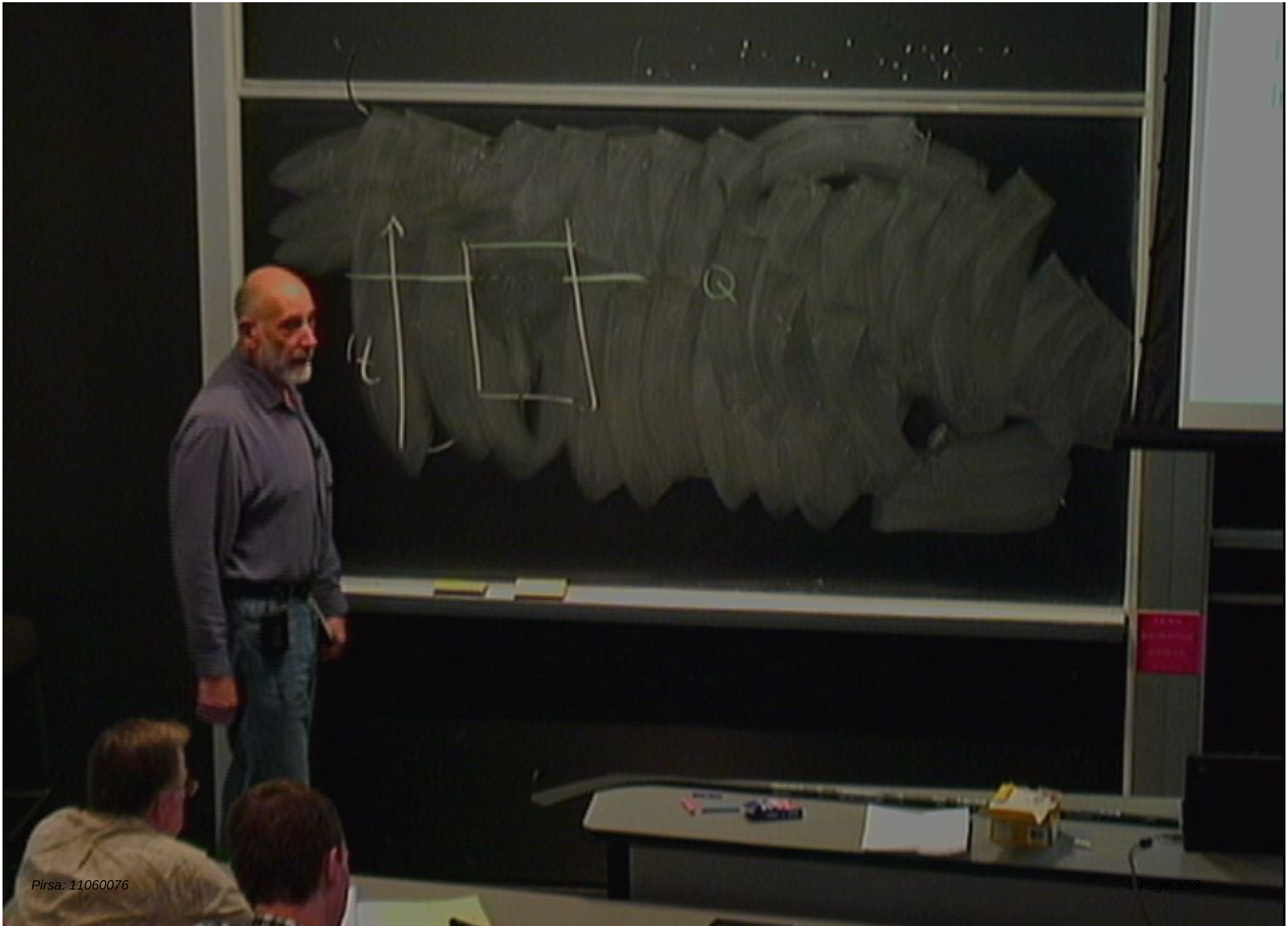
URL: http://pirsa.org/11060076

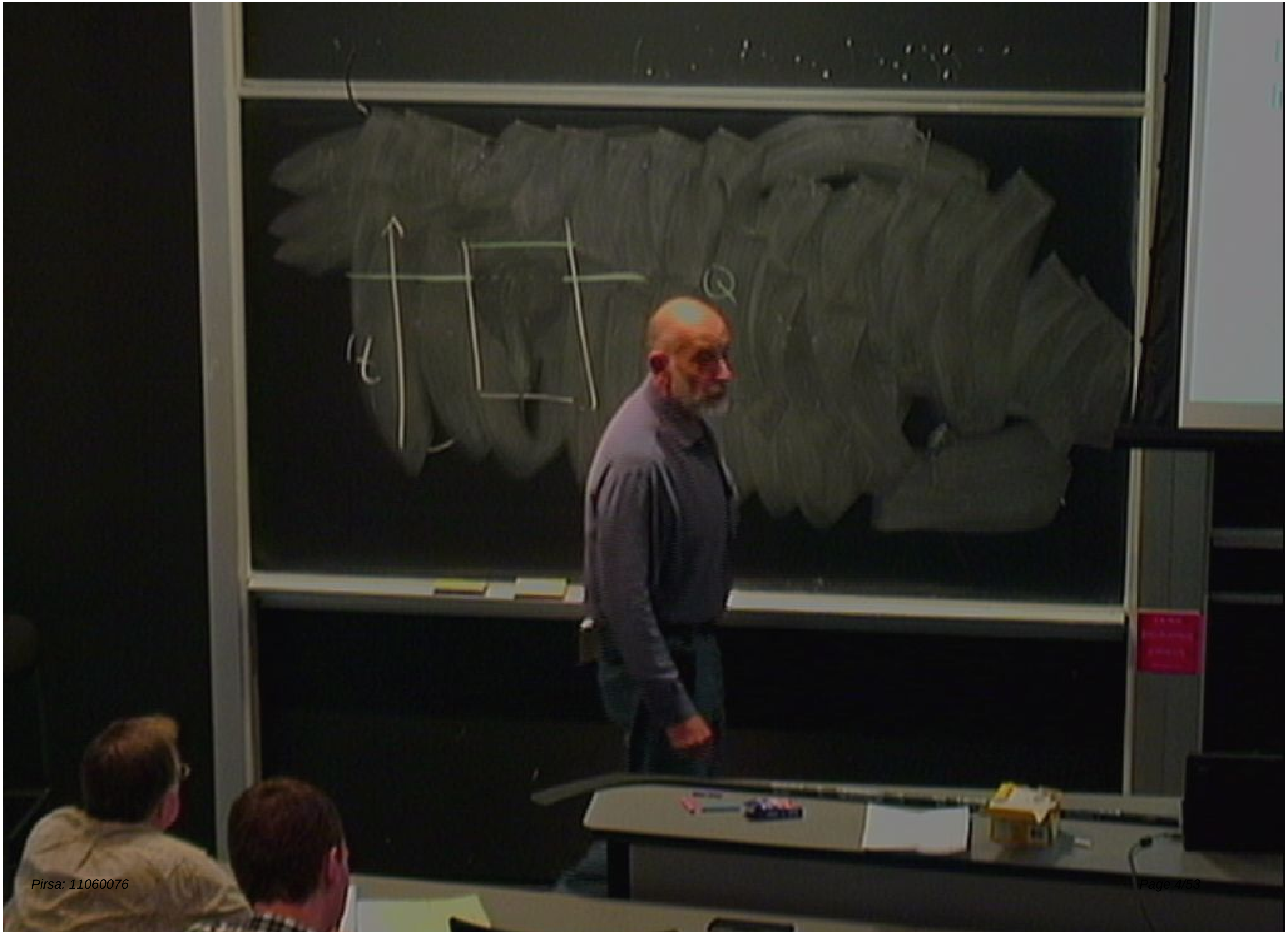
Abstract:

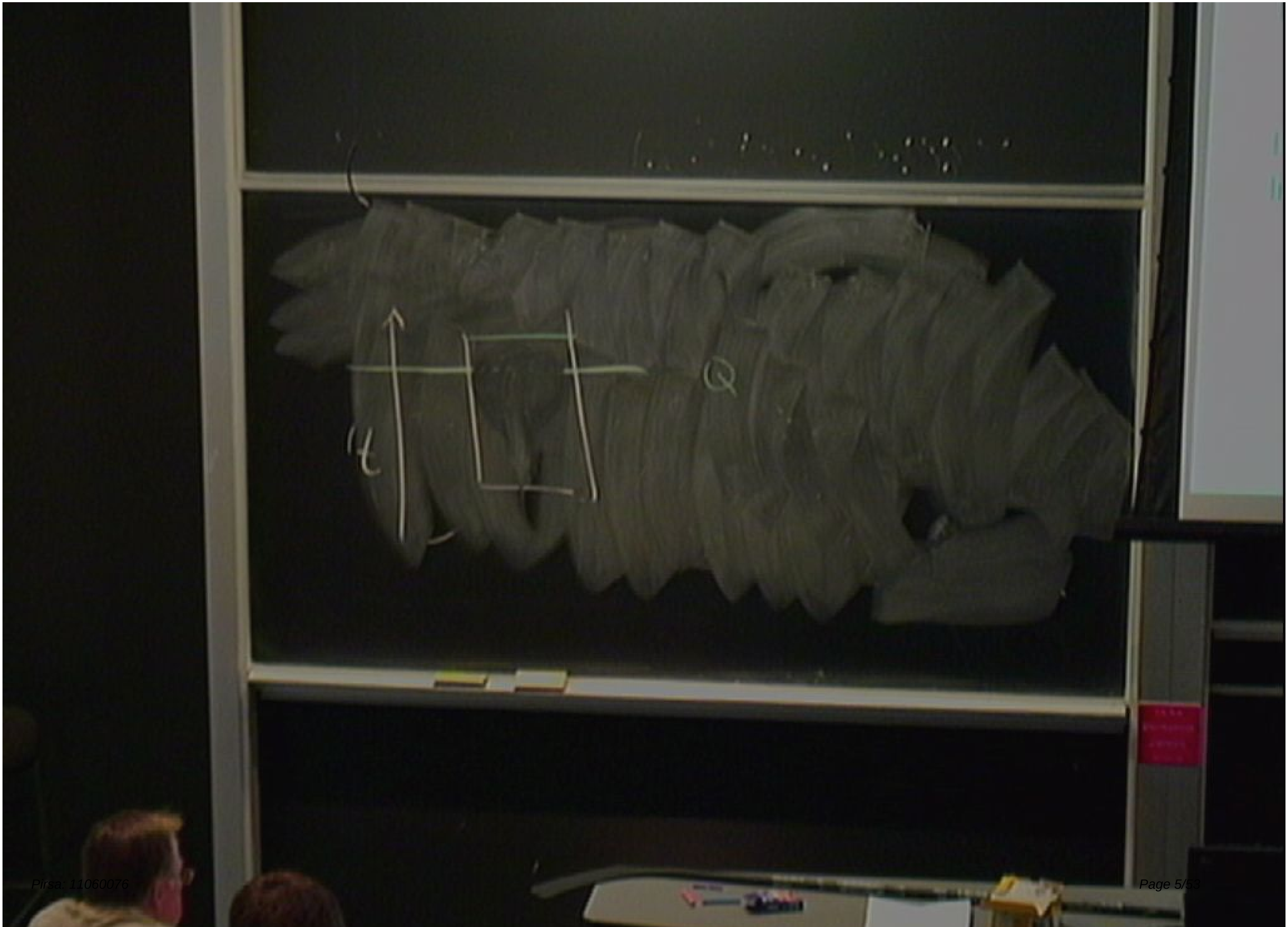
Because they are supersymmetric hats have the best chance of providing a precise description of eternal inflation.

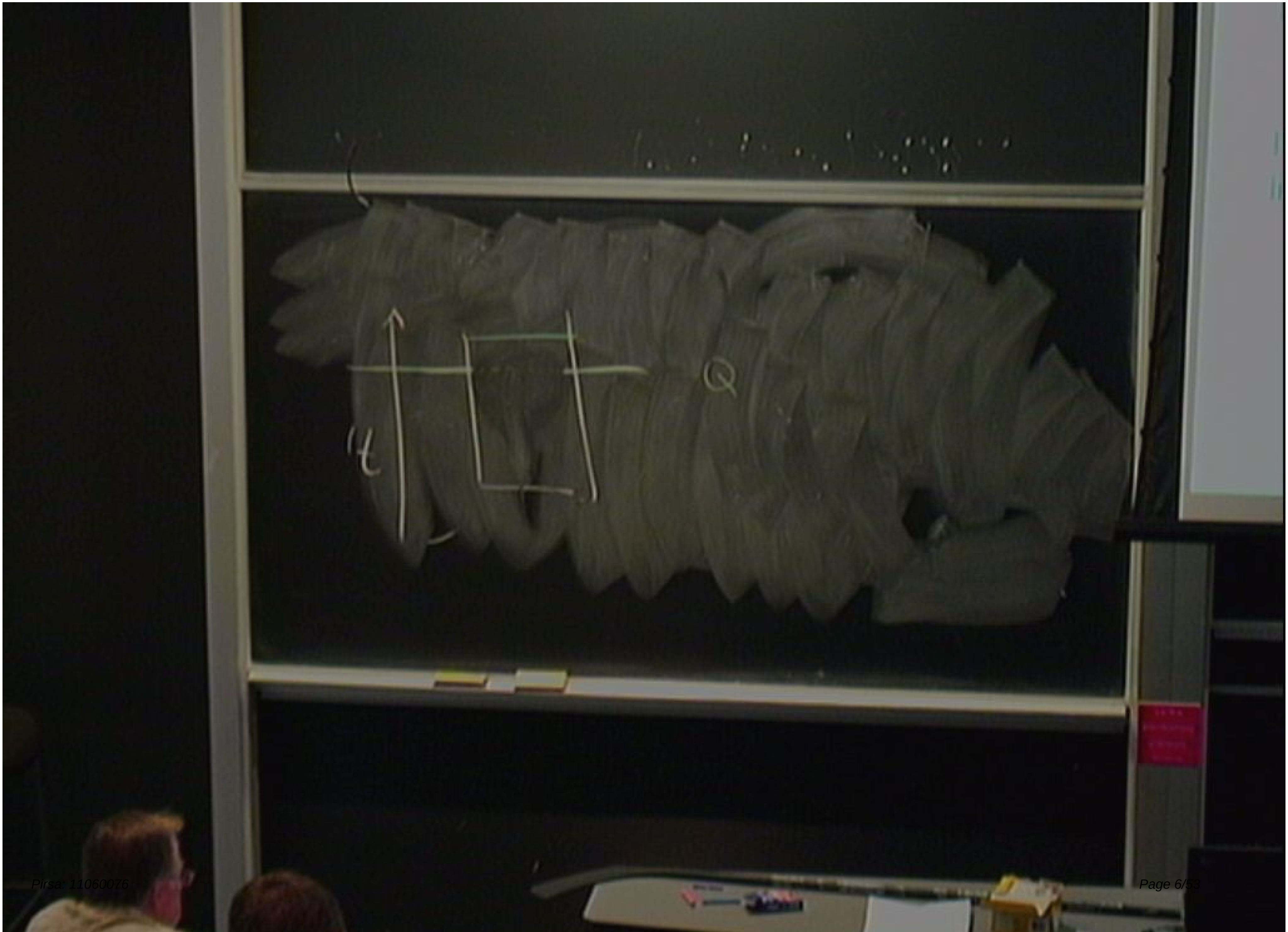
Is there a complementarity between the degrees of freedom of a hat-geometry and those of the multiverse?

Is the dictionary simple enough to help us solve problems like the measure problem?






t
Q



Because they are supersymmetric hats have the best chance of providing a precise description of eternal inflation.

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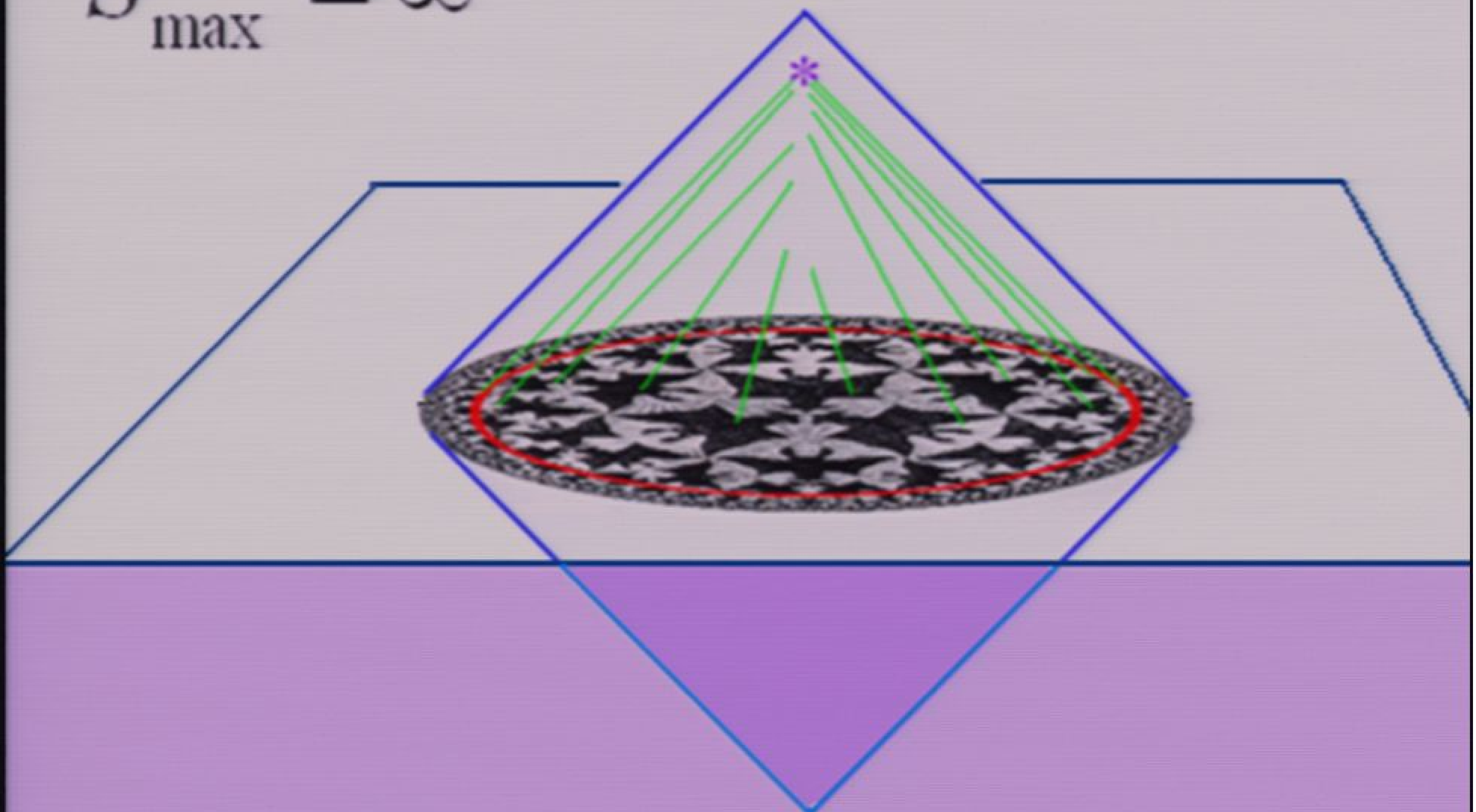
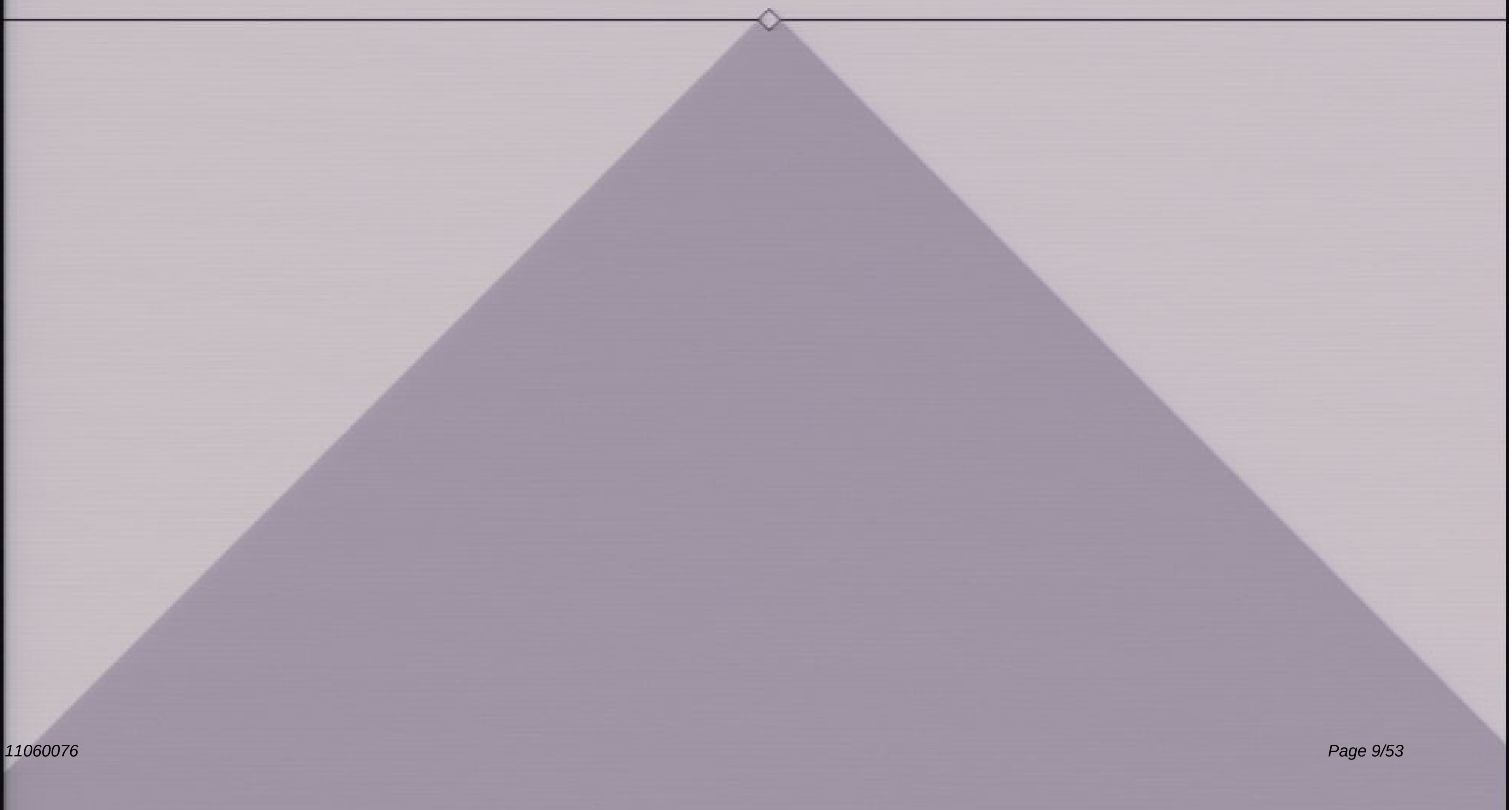
$S_{max} = \infty$



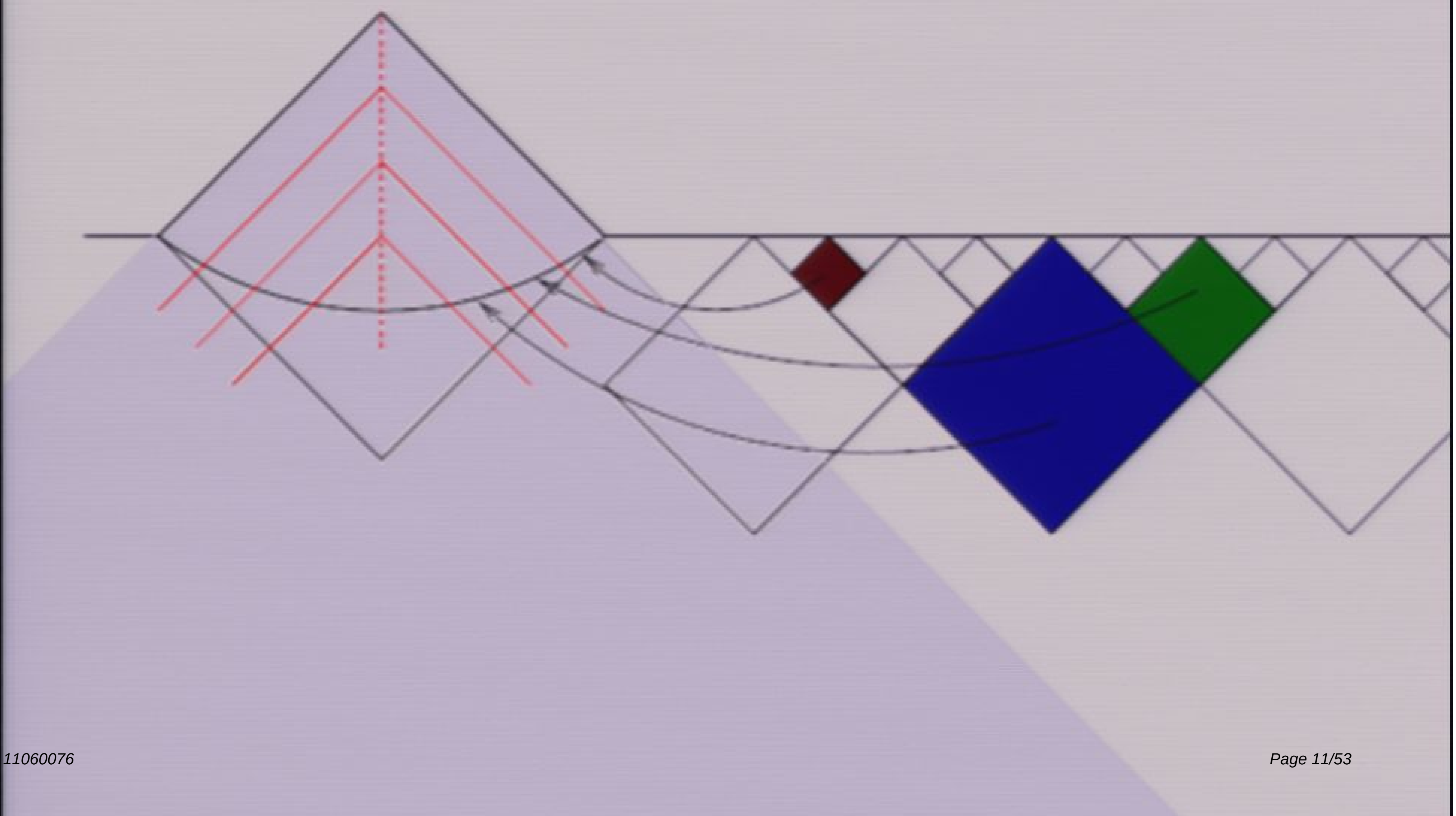
Number of dof in de Sitter causal patch = S_{ds}

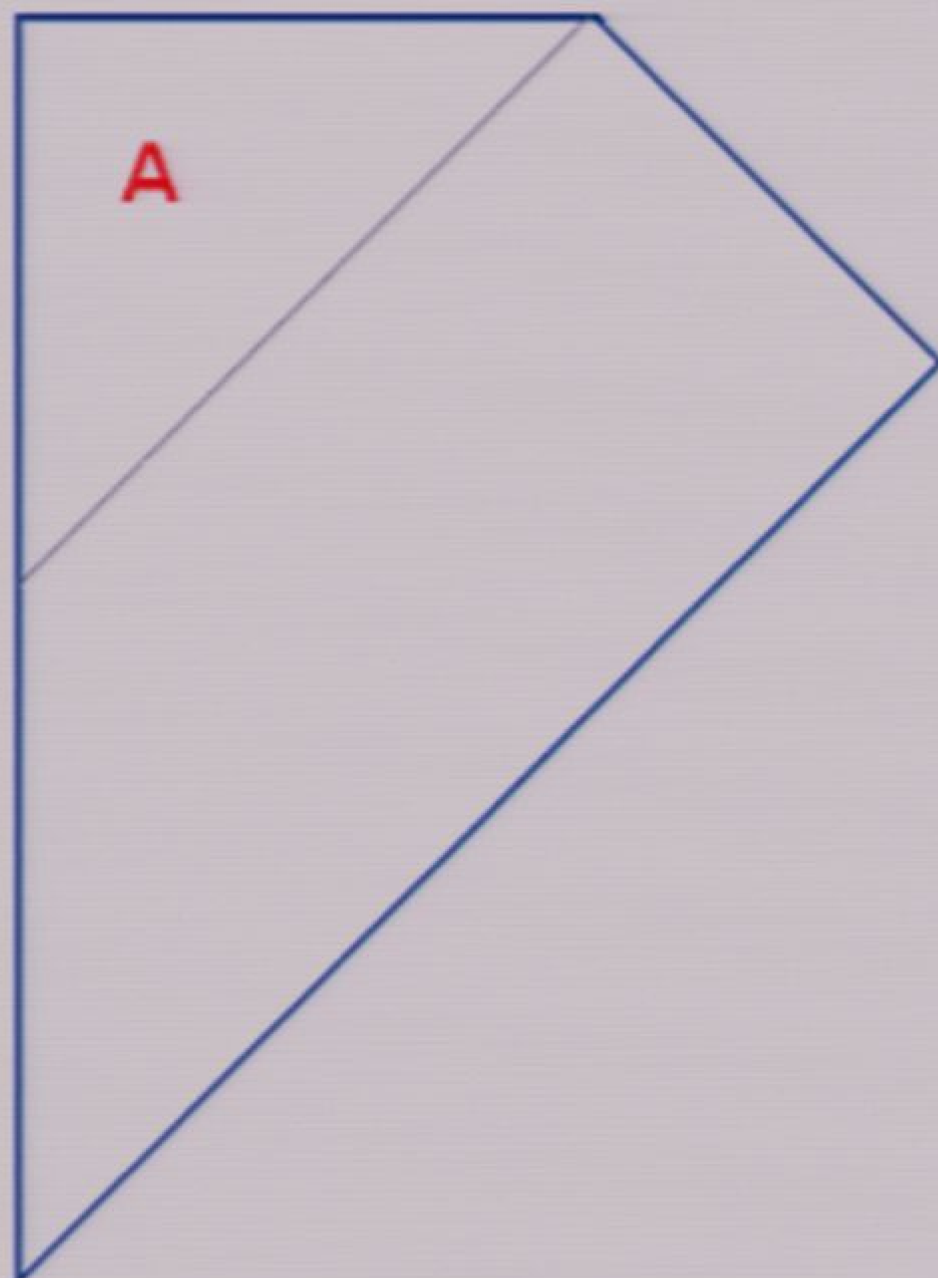
Number of dof in hat = ∞

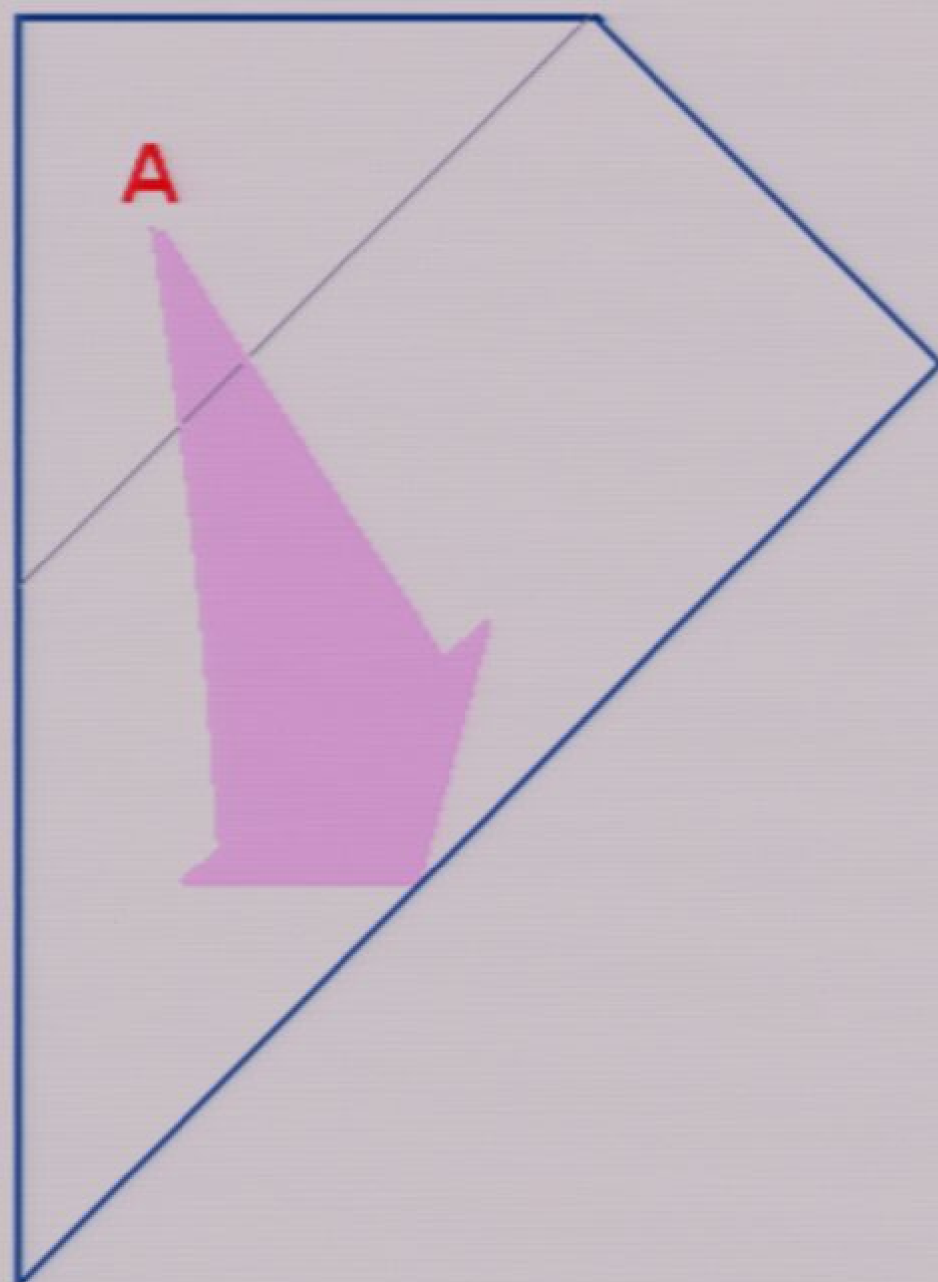


What does the ∞ extra information describe?

The rest of the multiverse.




A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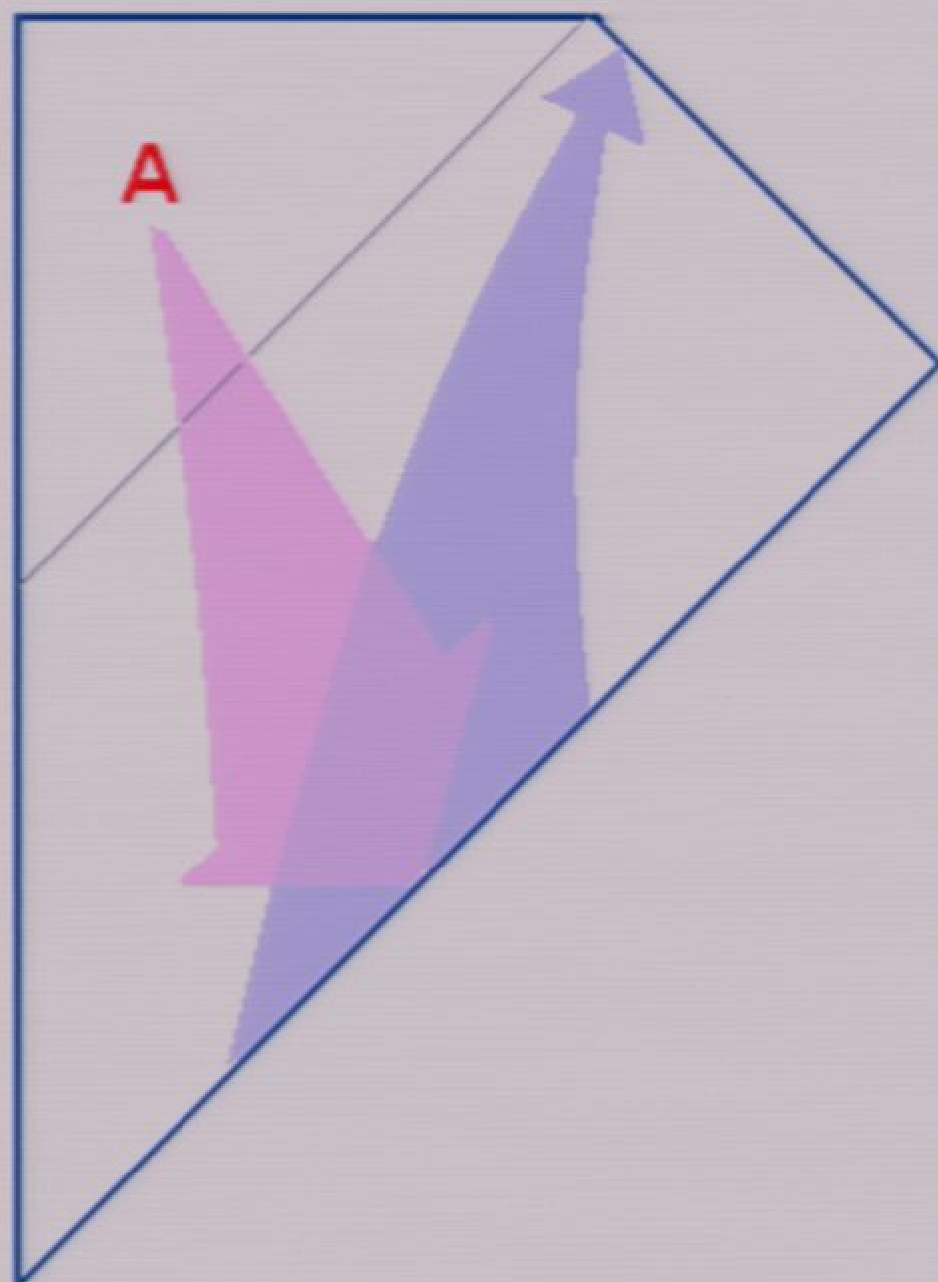
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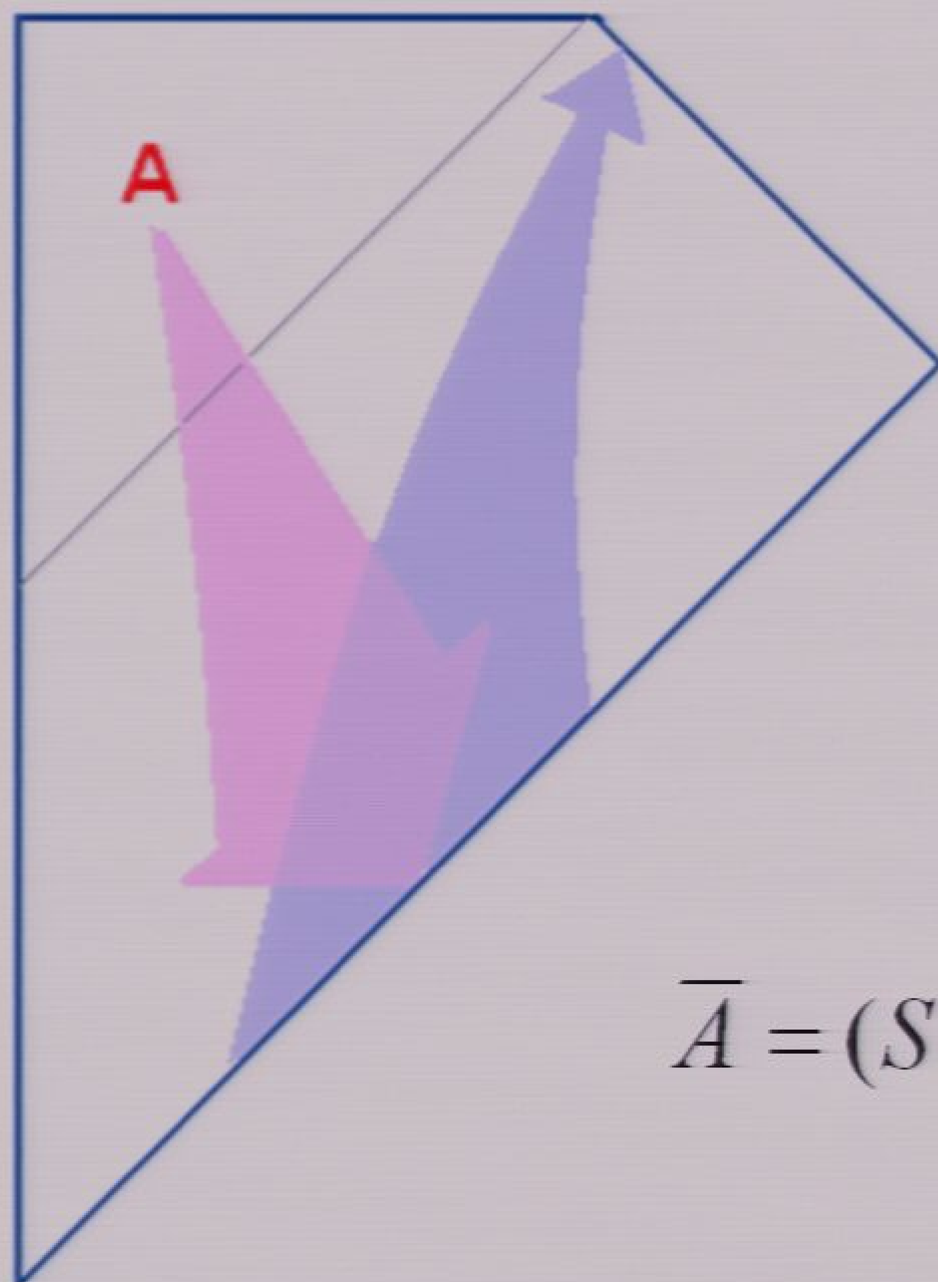
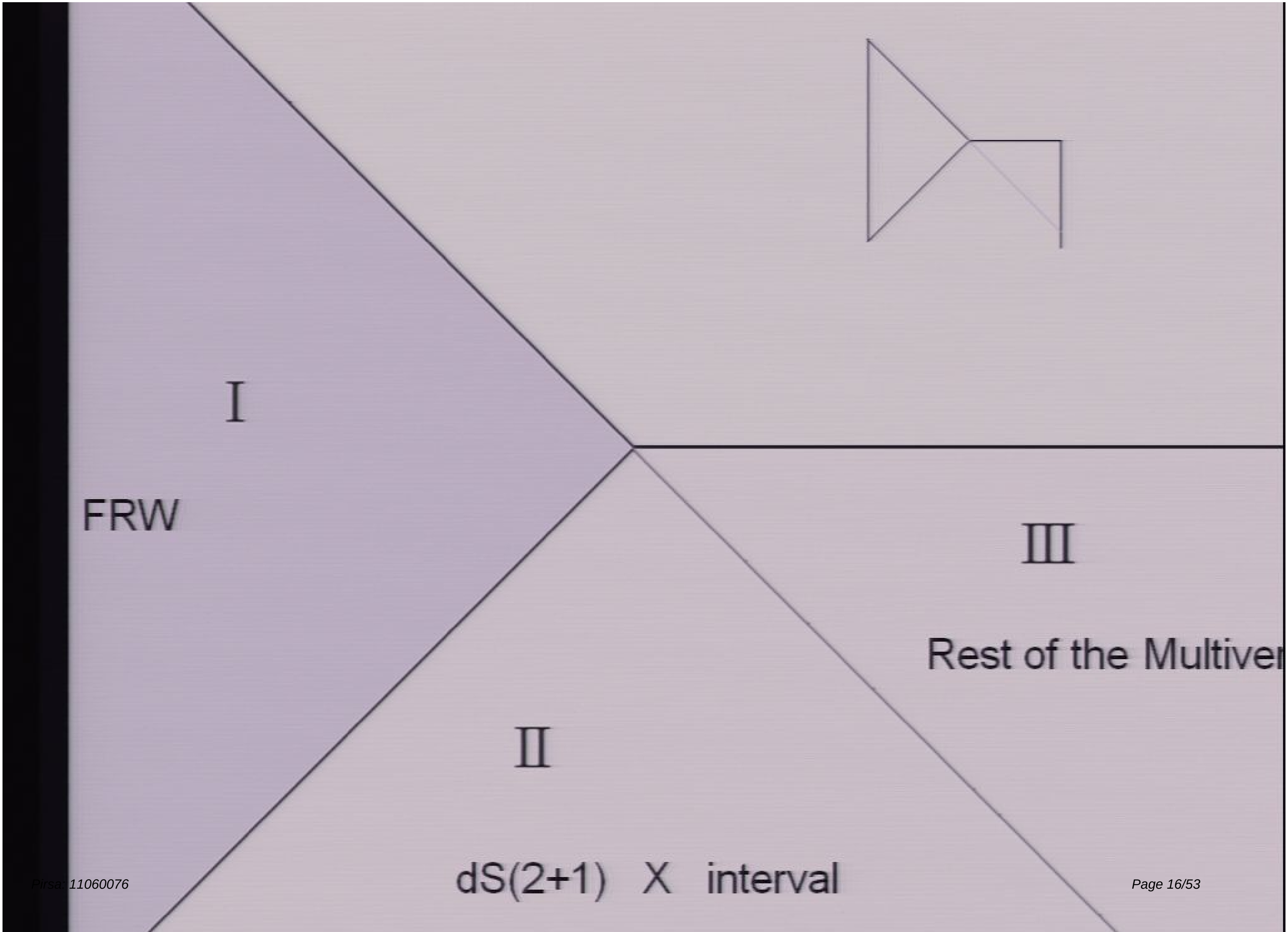
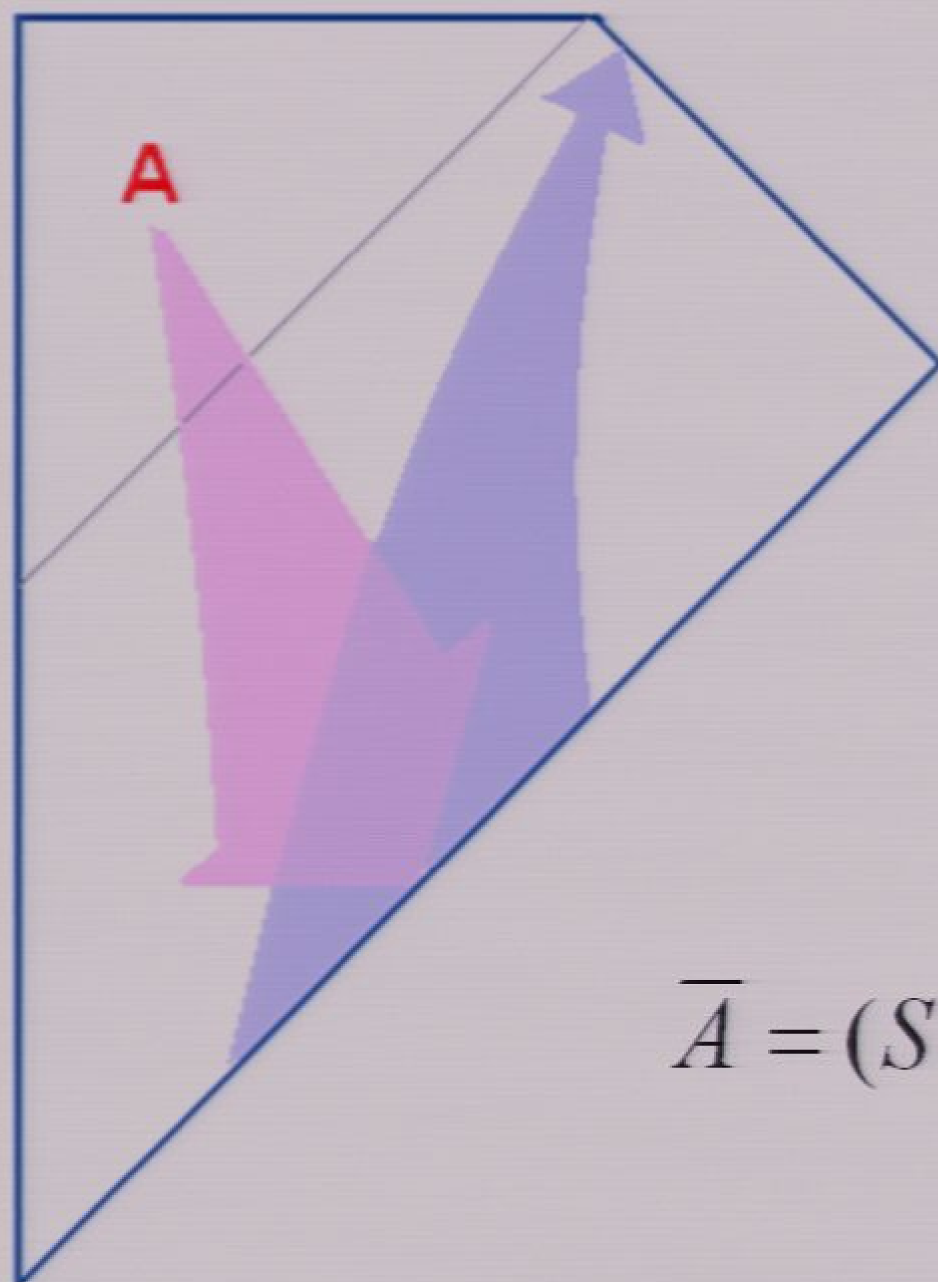


$$\overline{A} = (S^{-1}U)A(U^{-1}S)$$



I
FRW
III
Rest of the Multiver
II
dS(2+1) X interval



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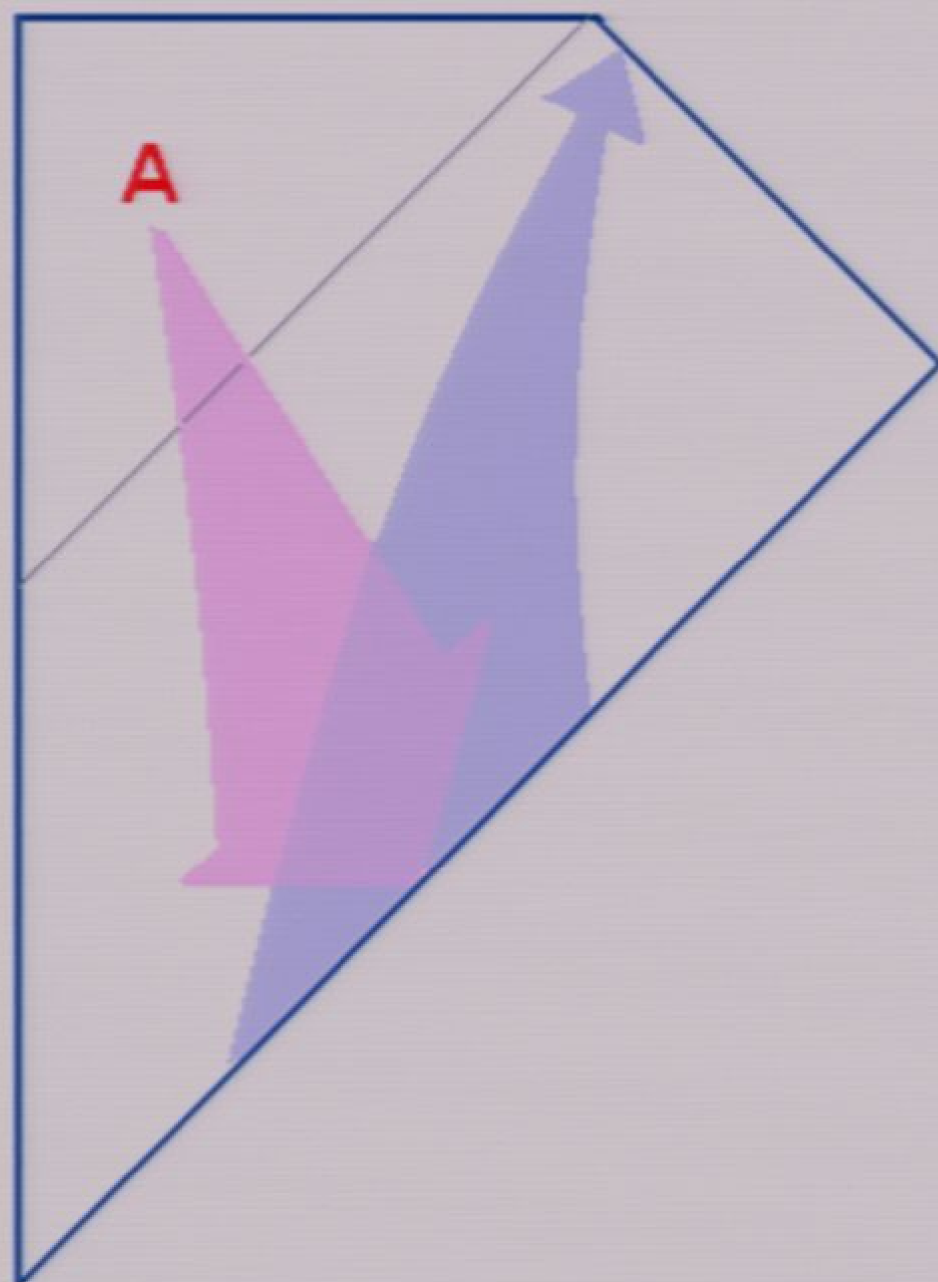
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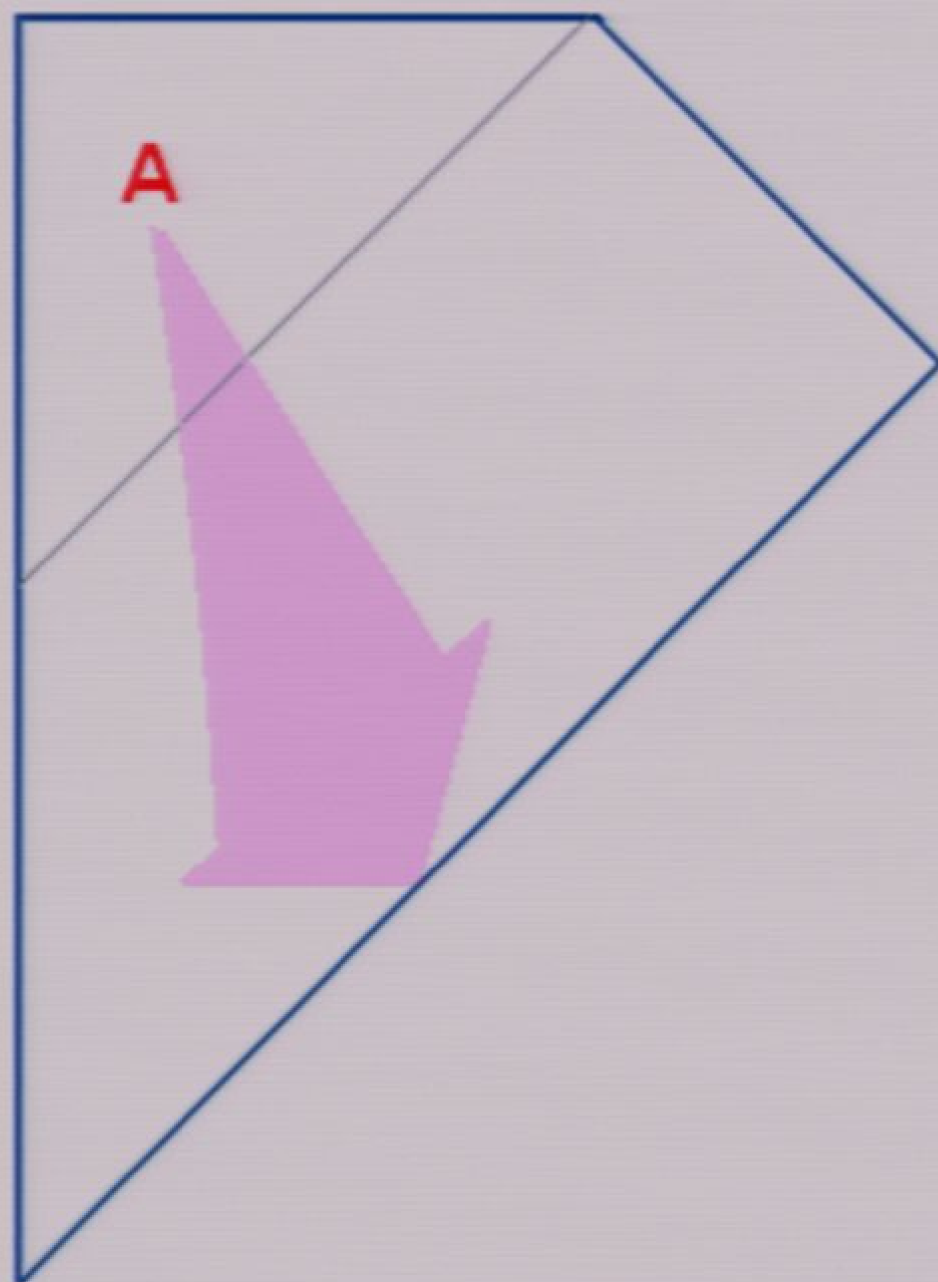
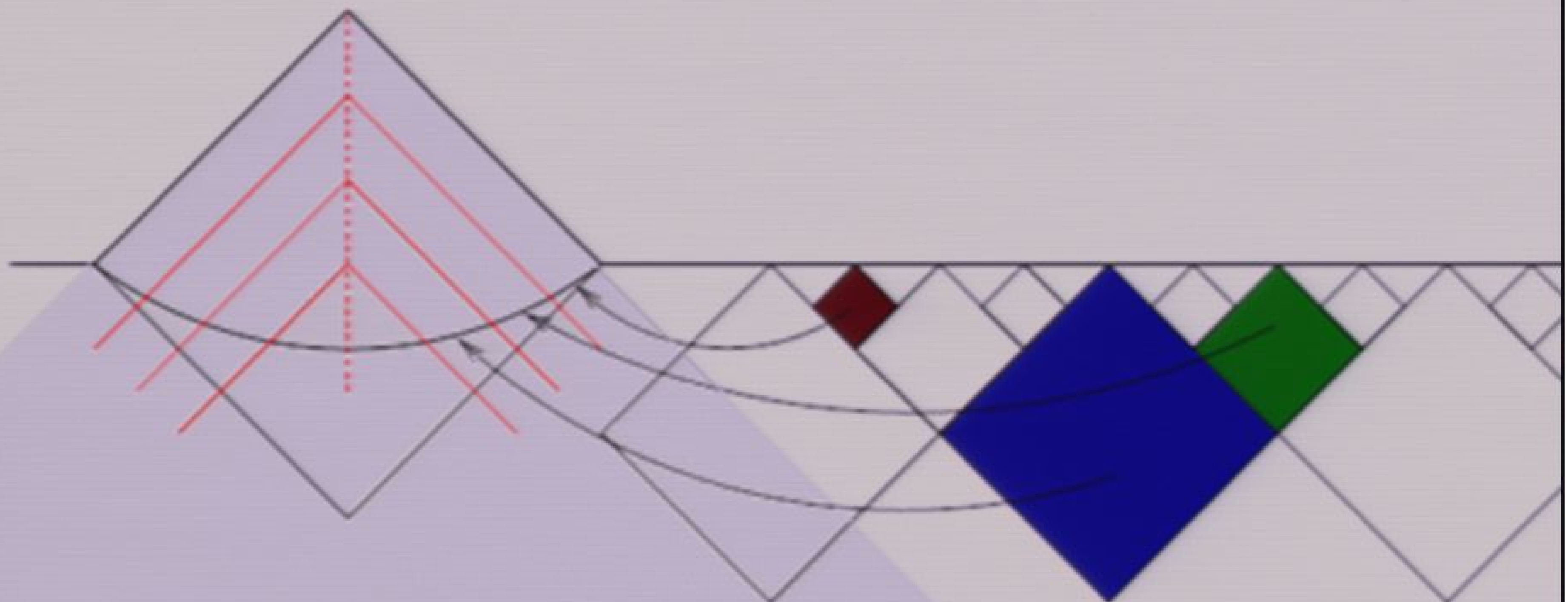
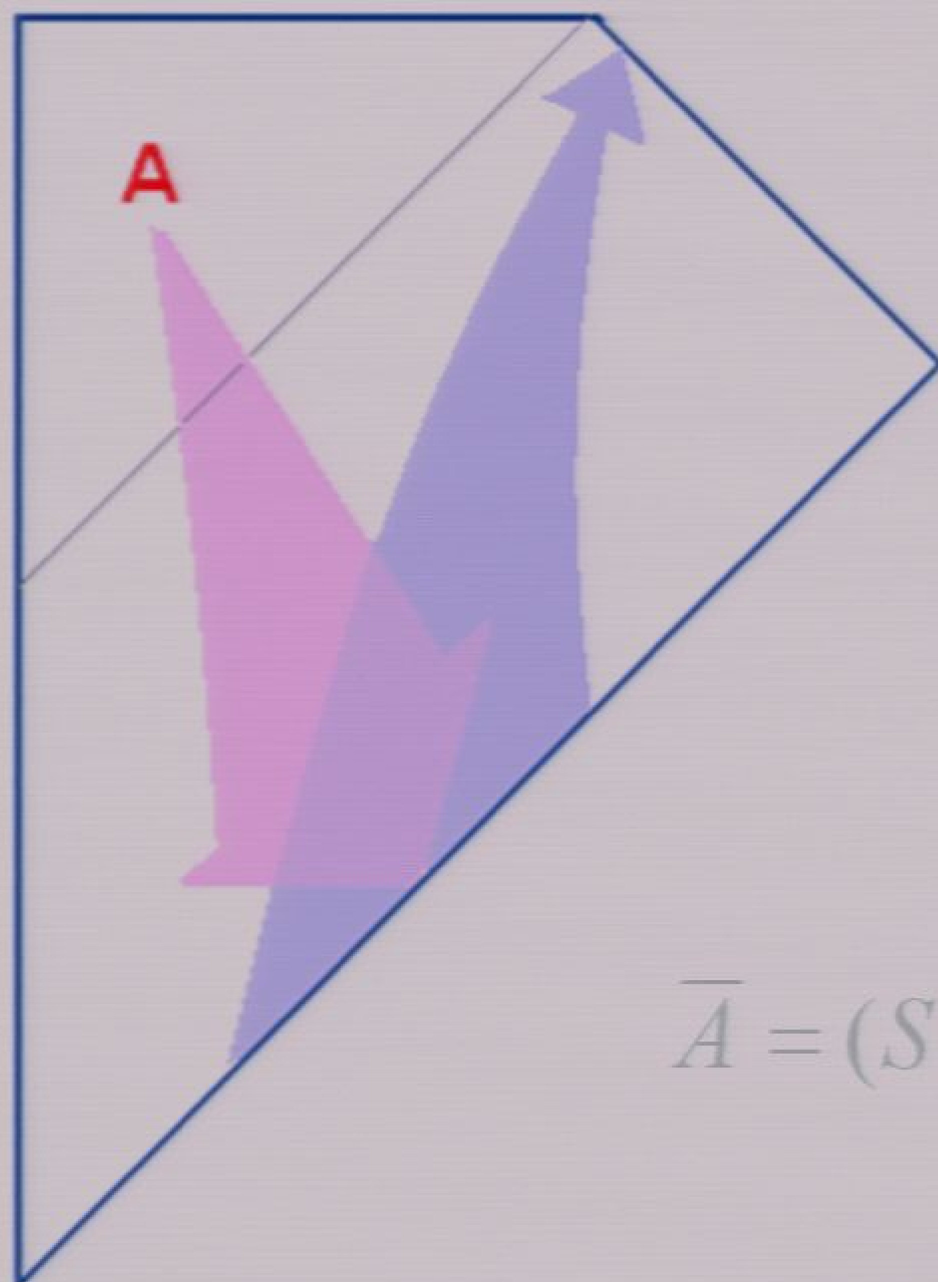

A

The rest of the multiverse.





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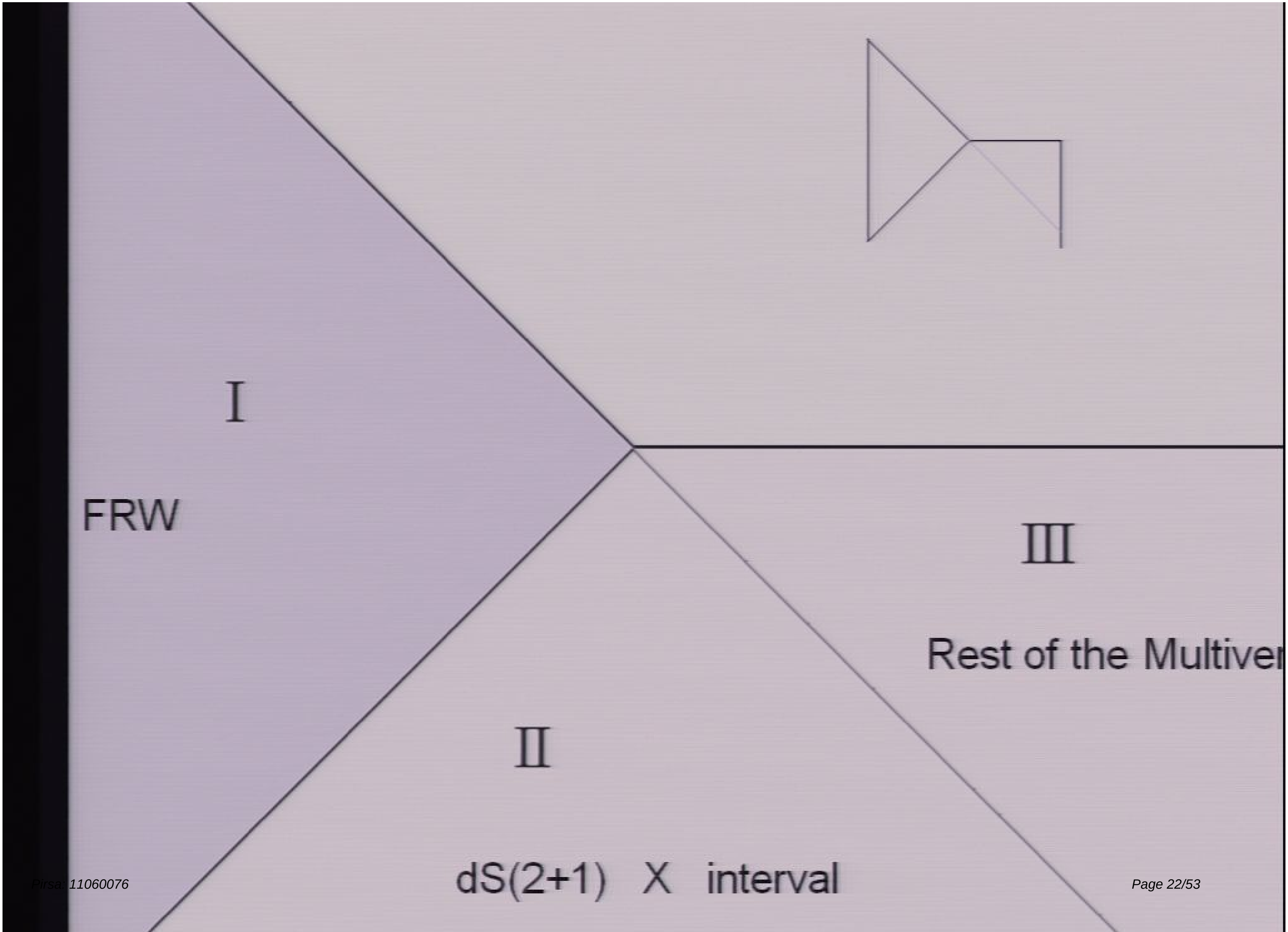
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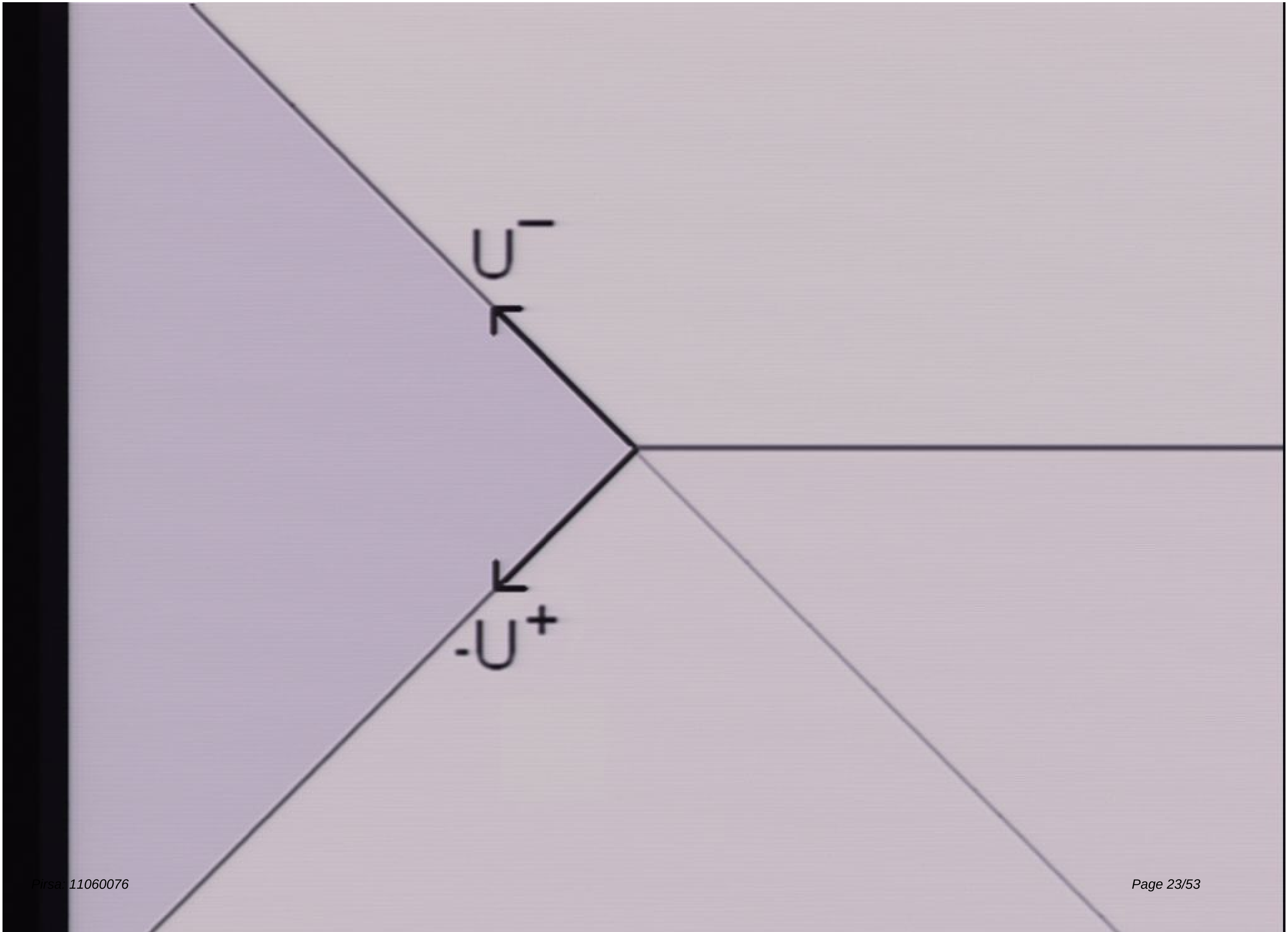
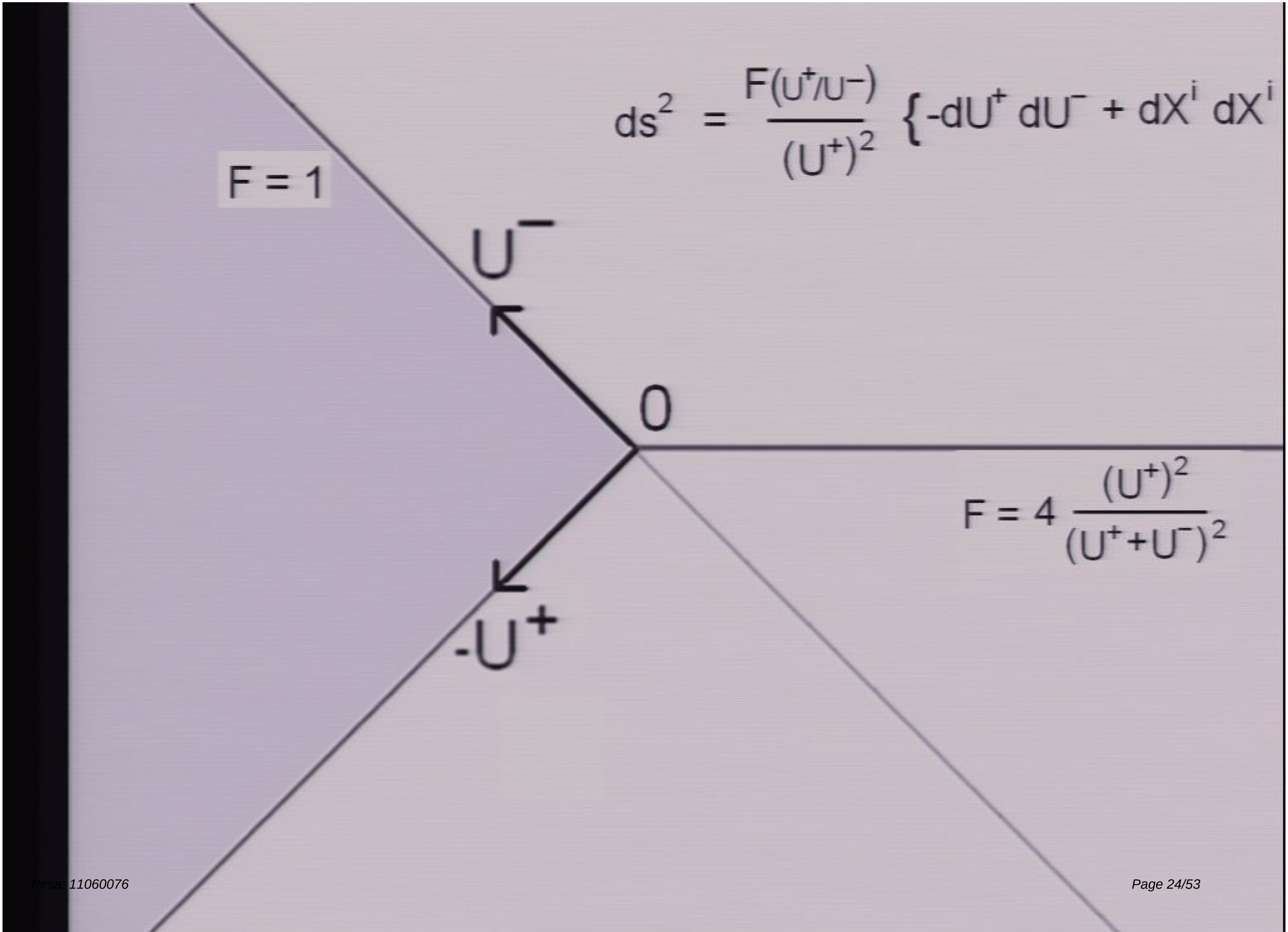
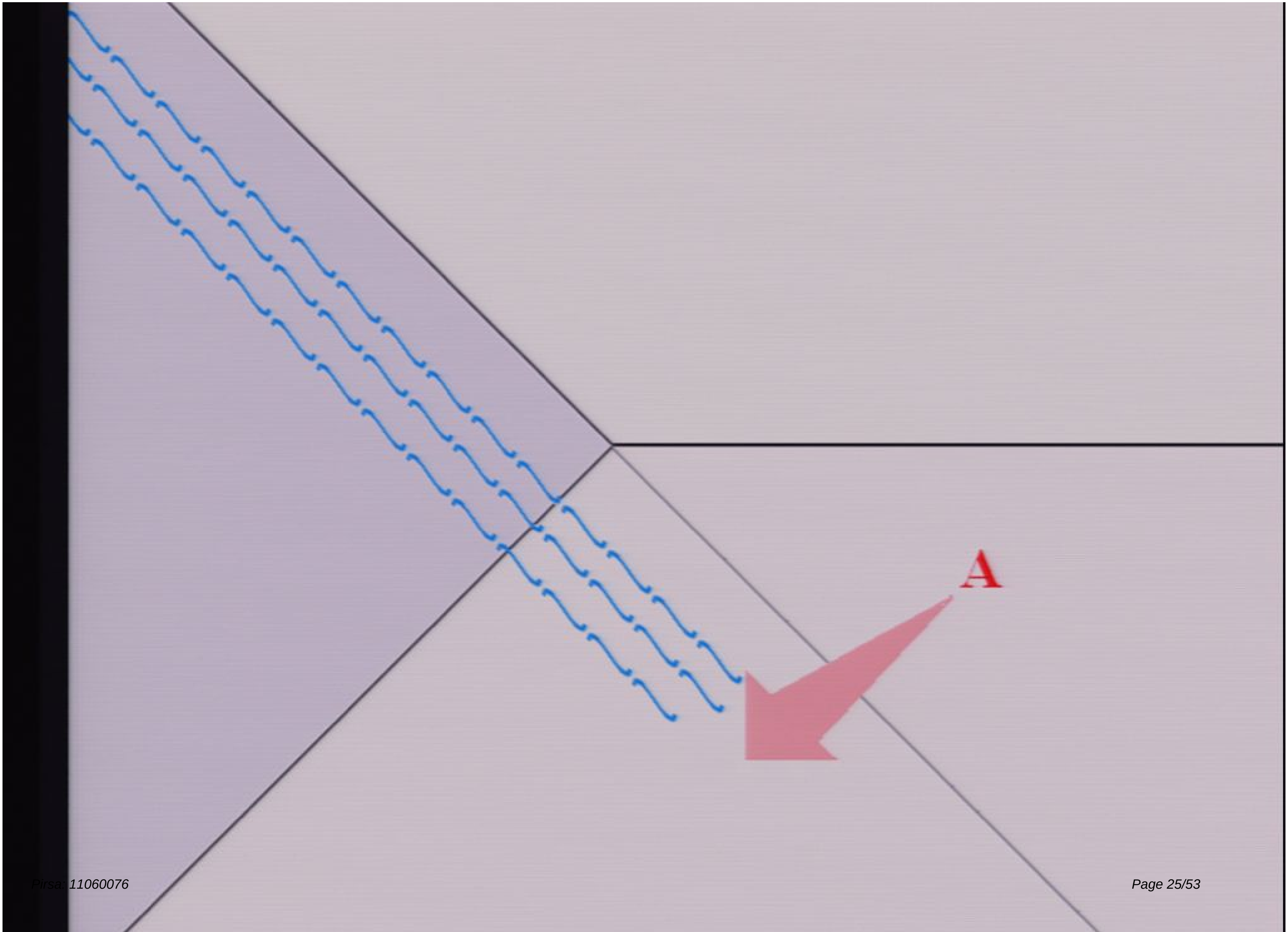

U^{-}
$-U^{+}$


$ds^2 = \frac{F(U^+/U^-)}{(U^+)^2} \{-dU^+ dU^- + dX^i dX^i$
F = 1
U^-
0
$-U^+$
$F = 4 \frac{(U^+)^2}{(U^+ + U^-)^2}$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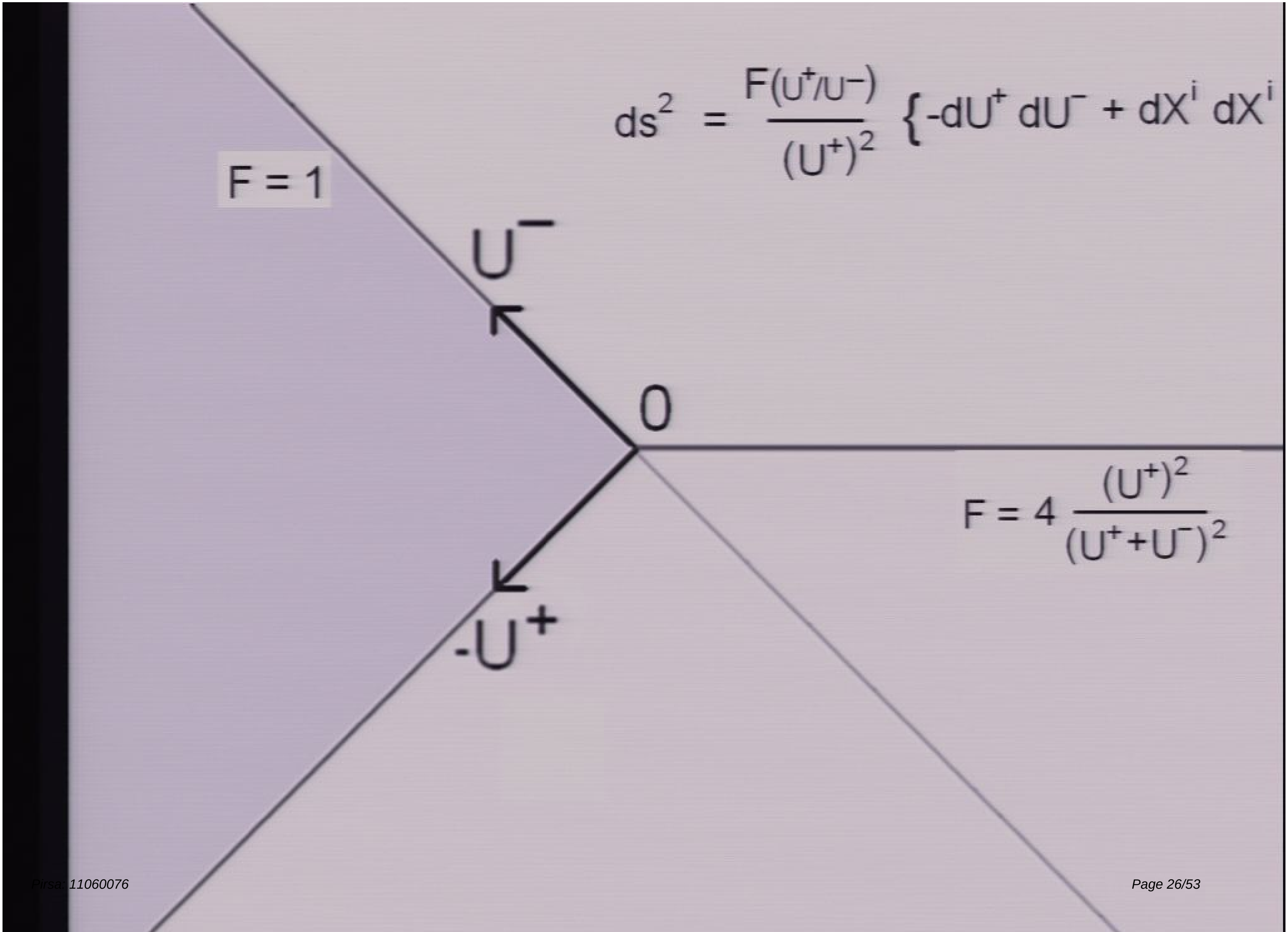

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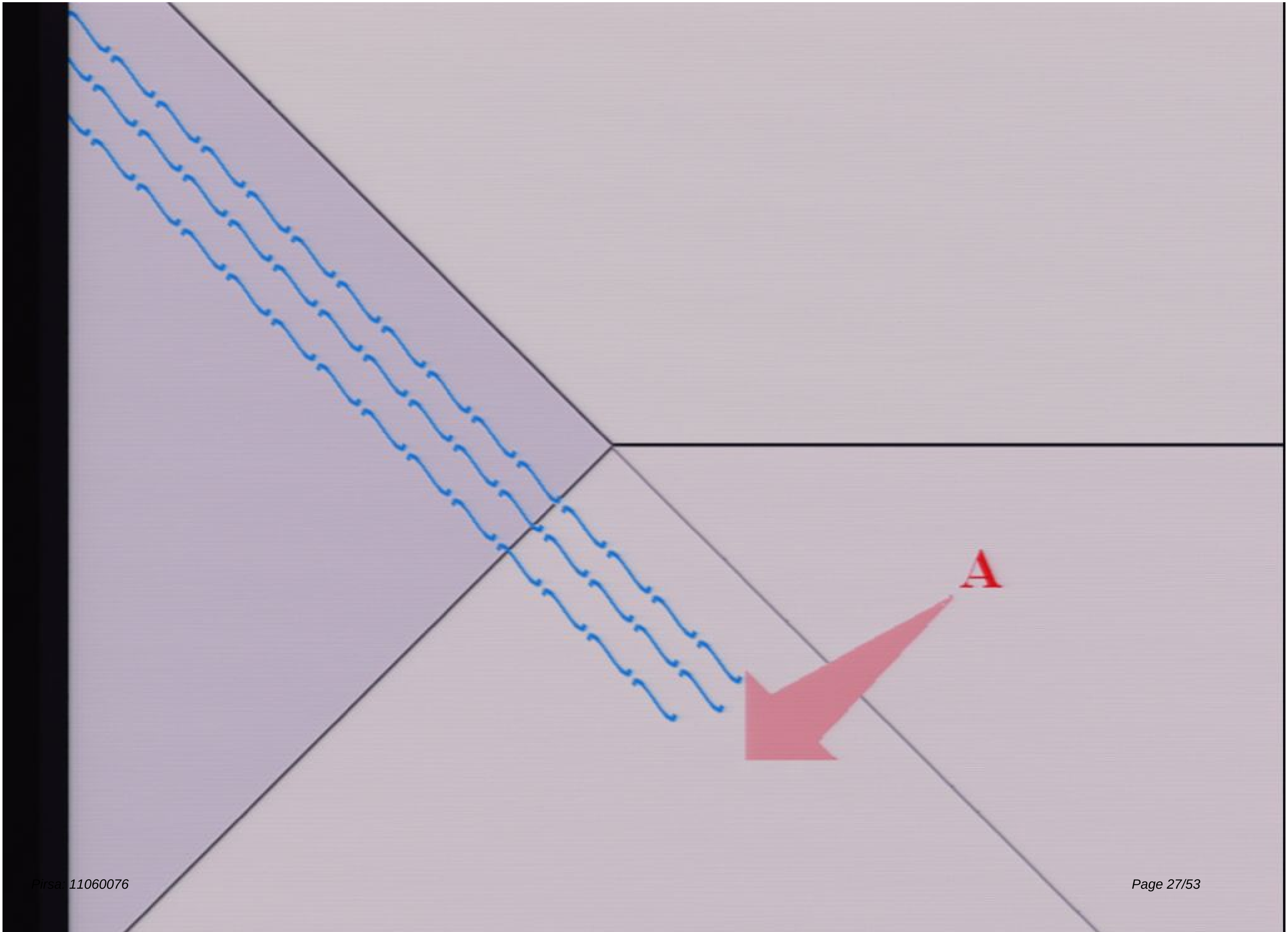
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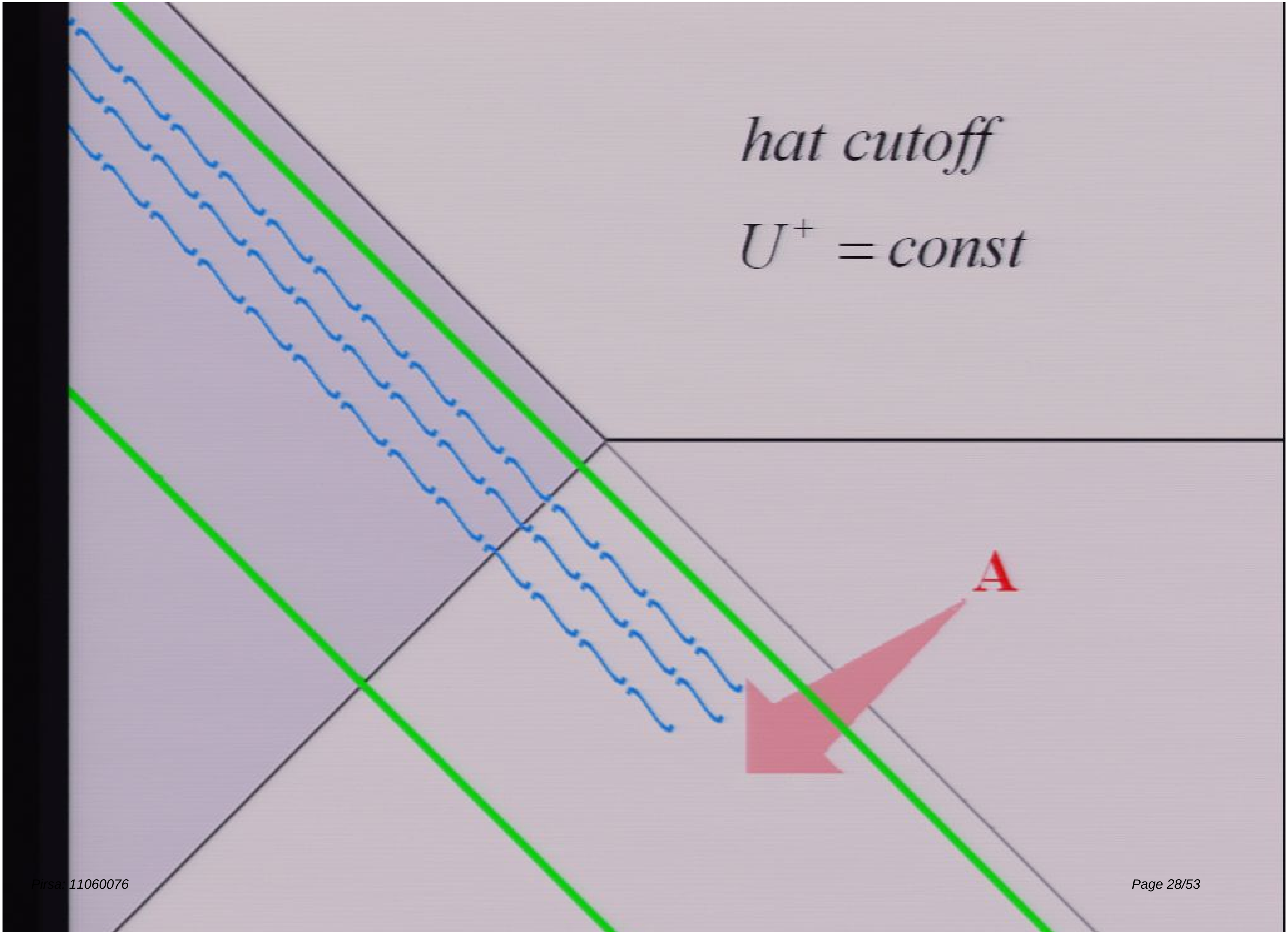
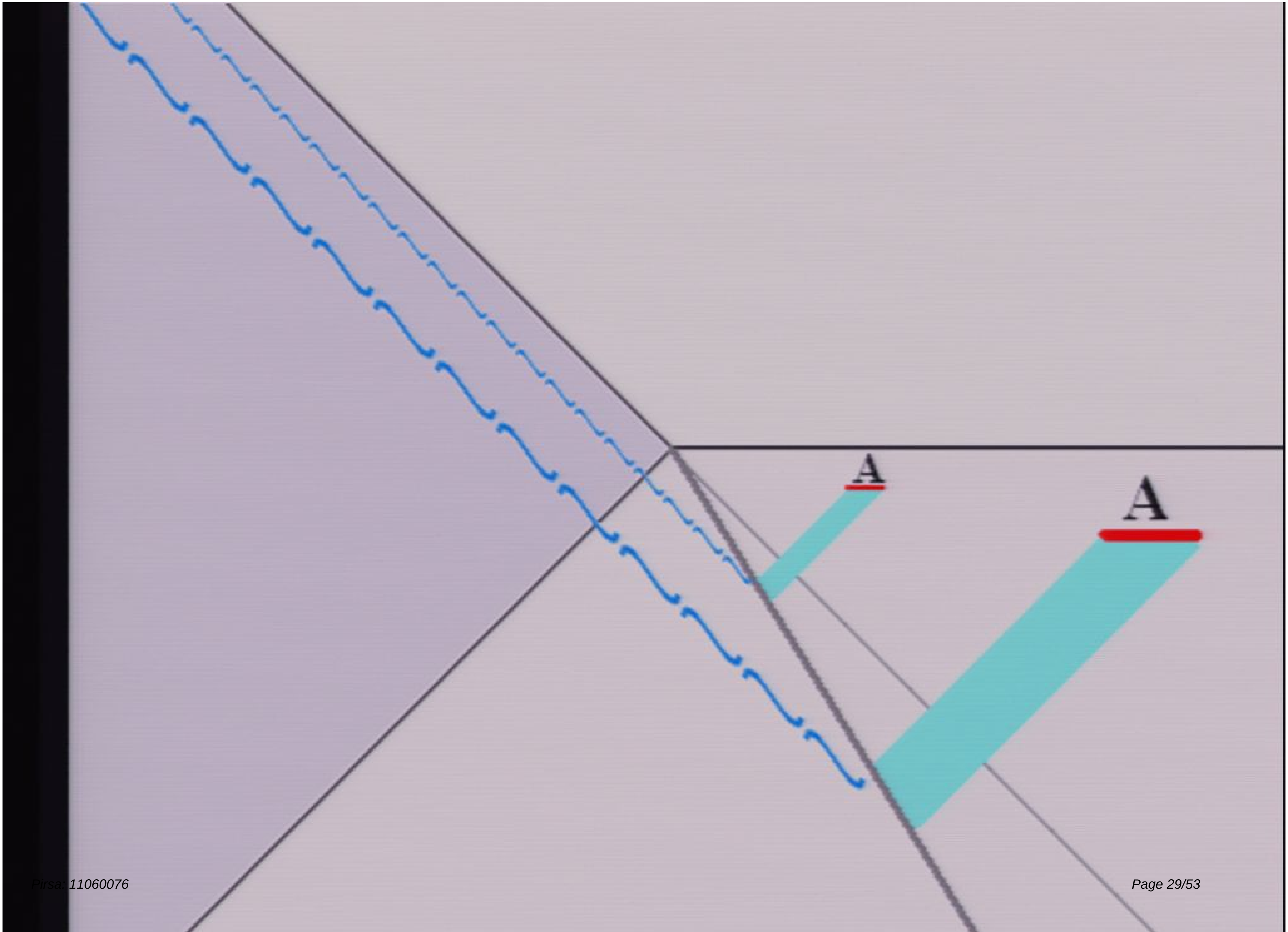
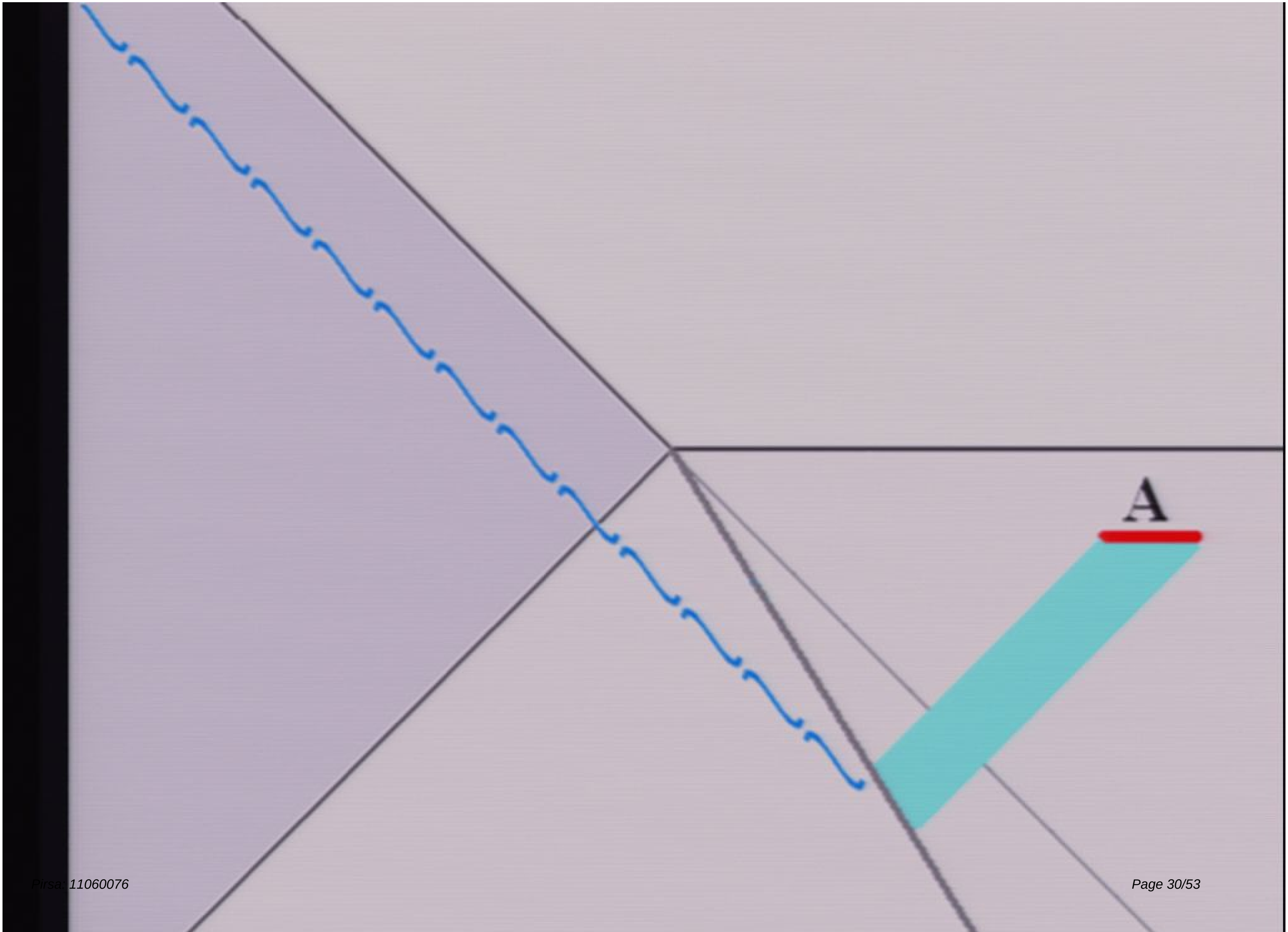

hat cutoff
$U^{+} = const$
A

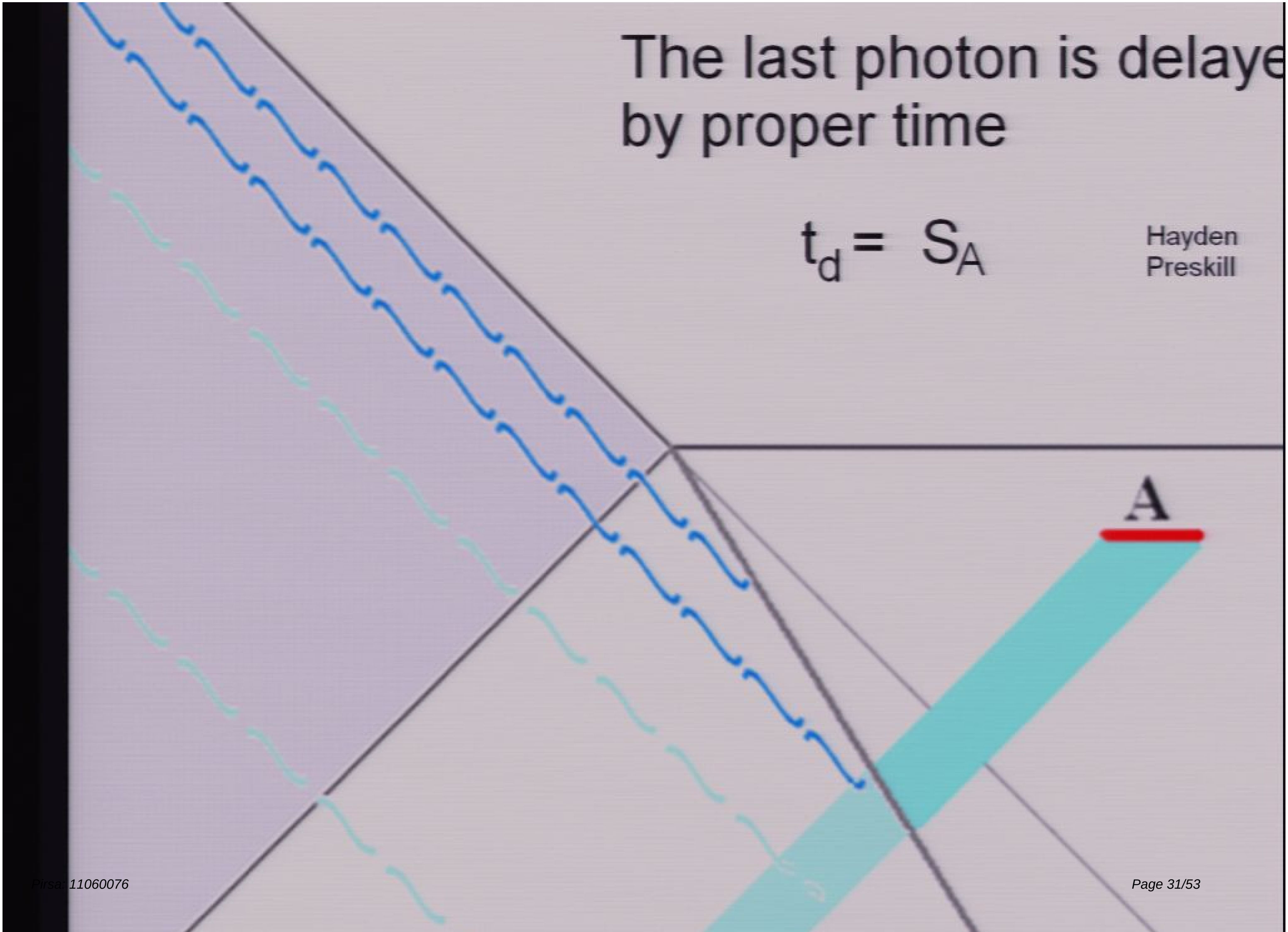

A
A


A

The last photon is delaye by proper time

$t_d = S_A$

Hayden
Preskill

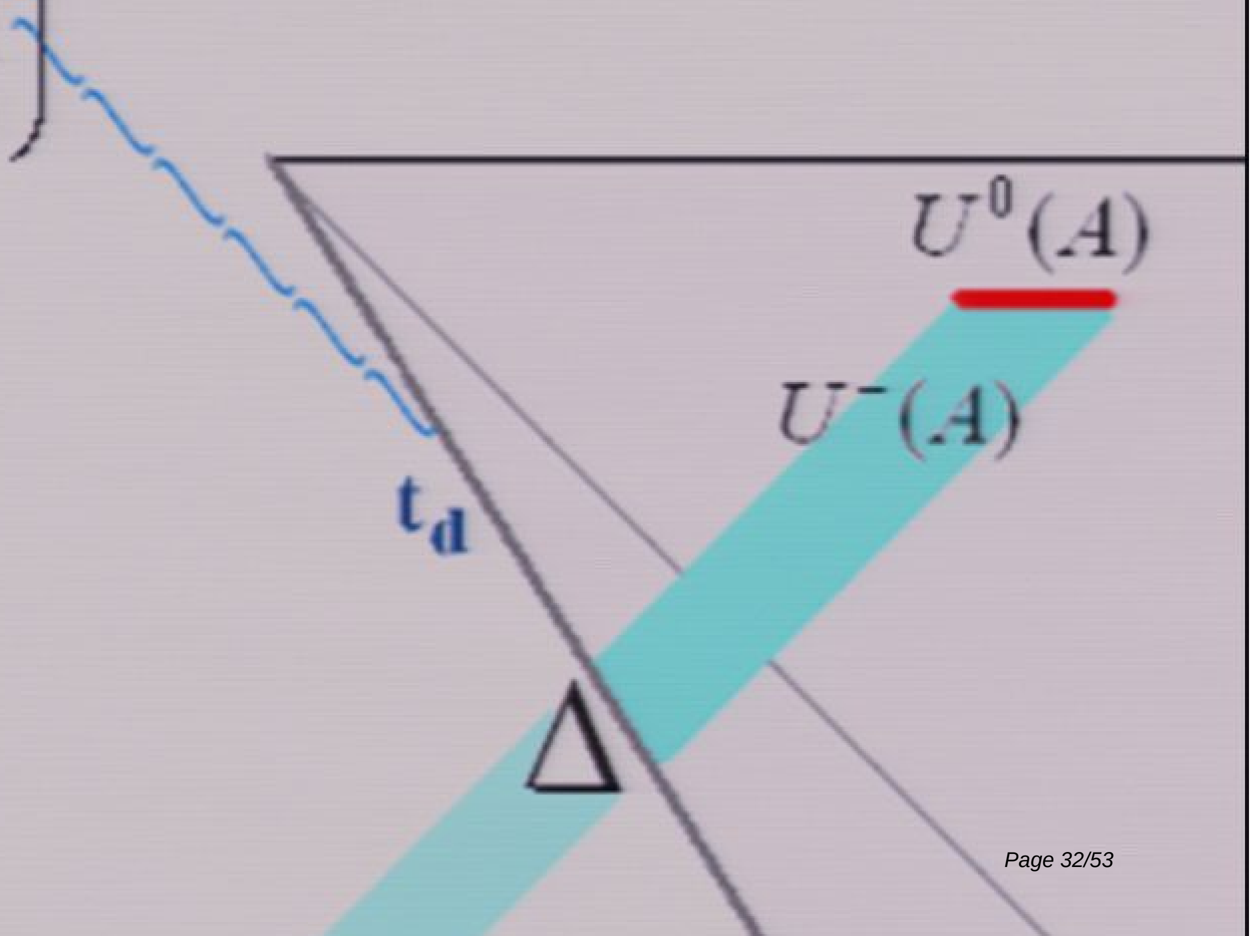


Positional Entropy

$$\Delta \propto U^{0}(A)$$

$$S_p(A) \approx \log\left|\frac{U^{-}(A)}{\Delta}\right|$$

$$= \log\left(\frac{U^{0}(A)}{U^{-}(A)}\right)$$

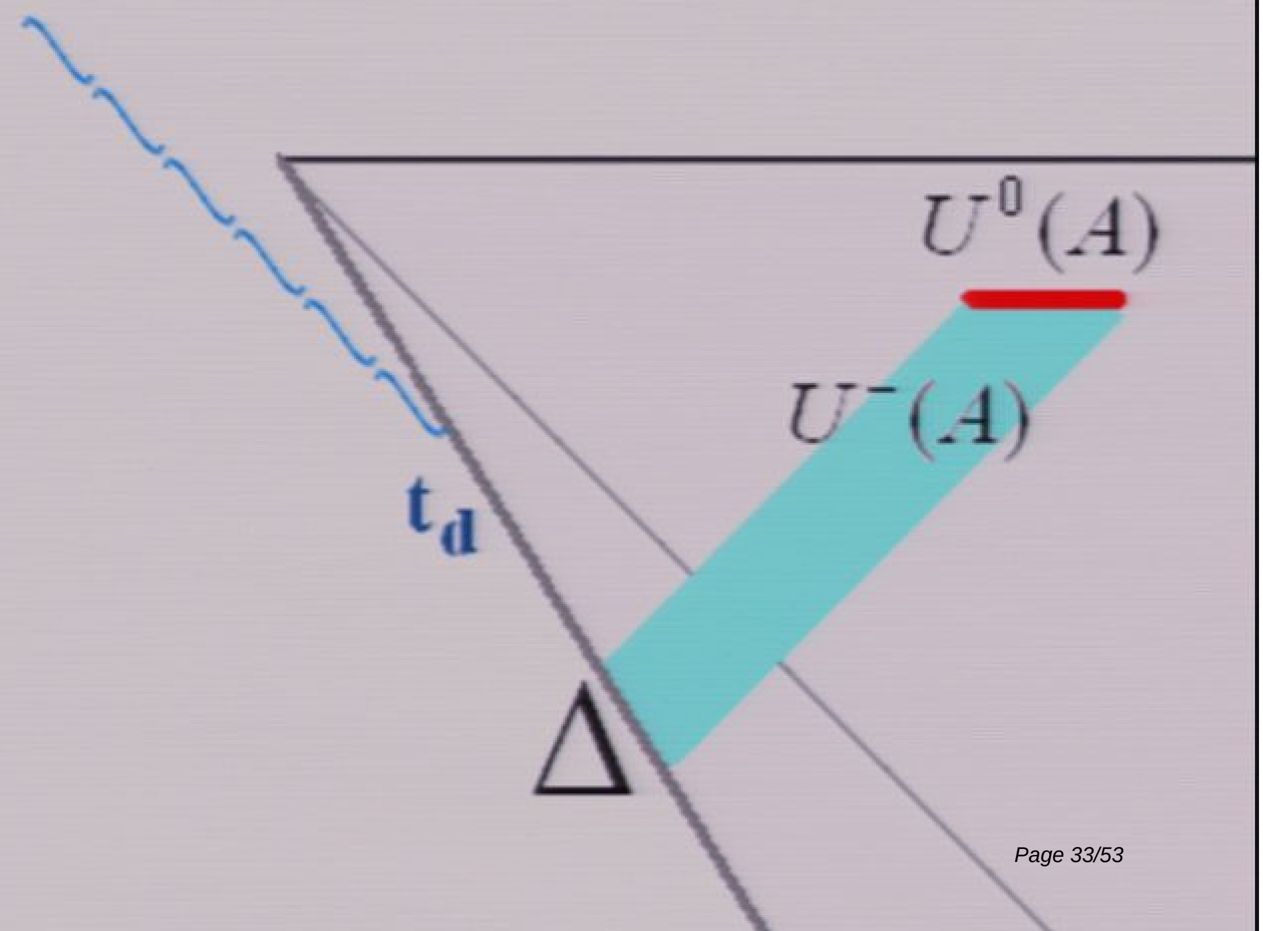


$$t_d = S_p(A) + S_{\text{int}}(A)$$

$$U^{+}{}_{last} \propto U^{-}(A)e^{-t_d}$$

$$= U^{0}(A)e^{-S_{\text{int}}(A)}$$

$$\Delta = U^{0}(A)$$



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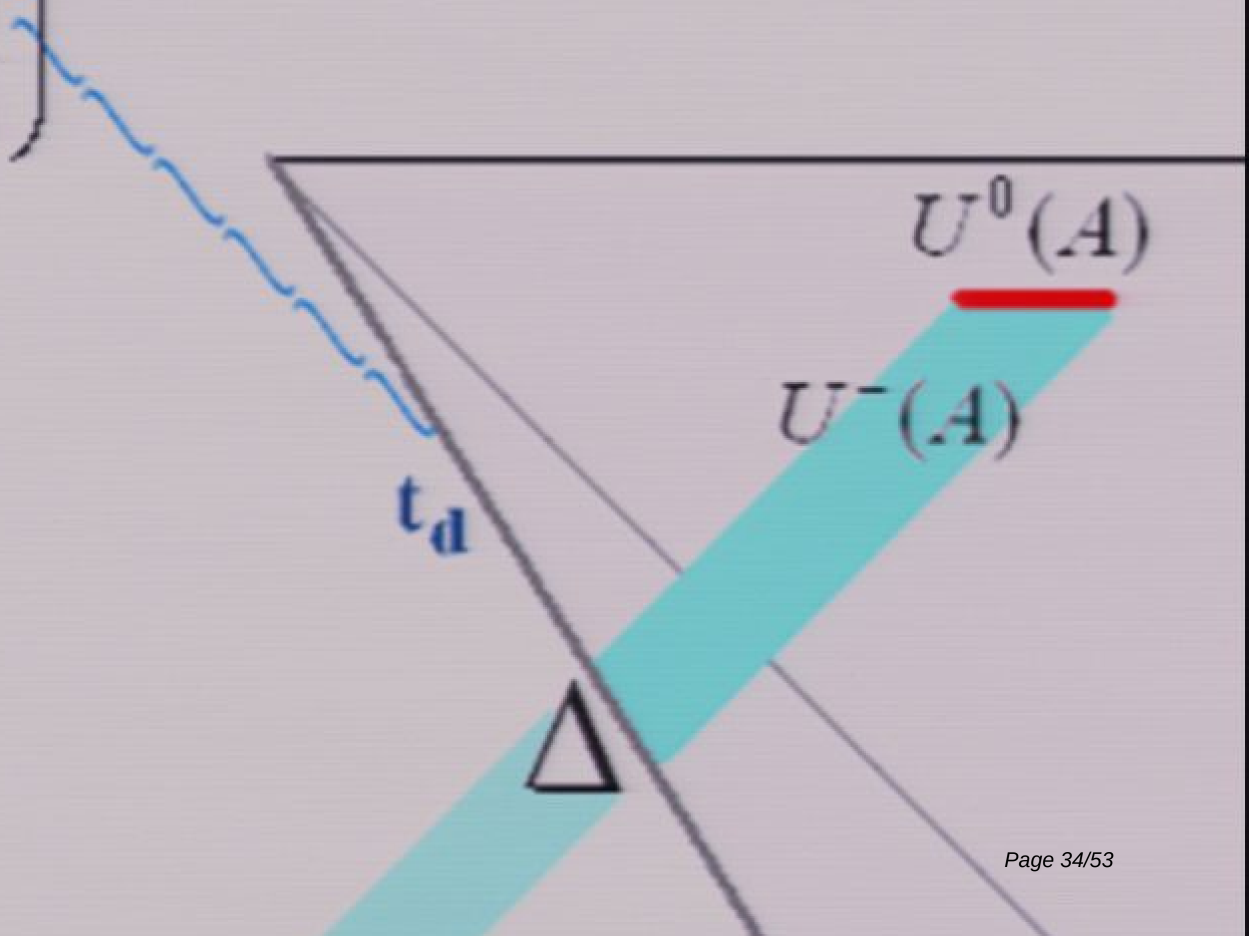

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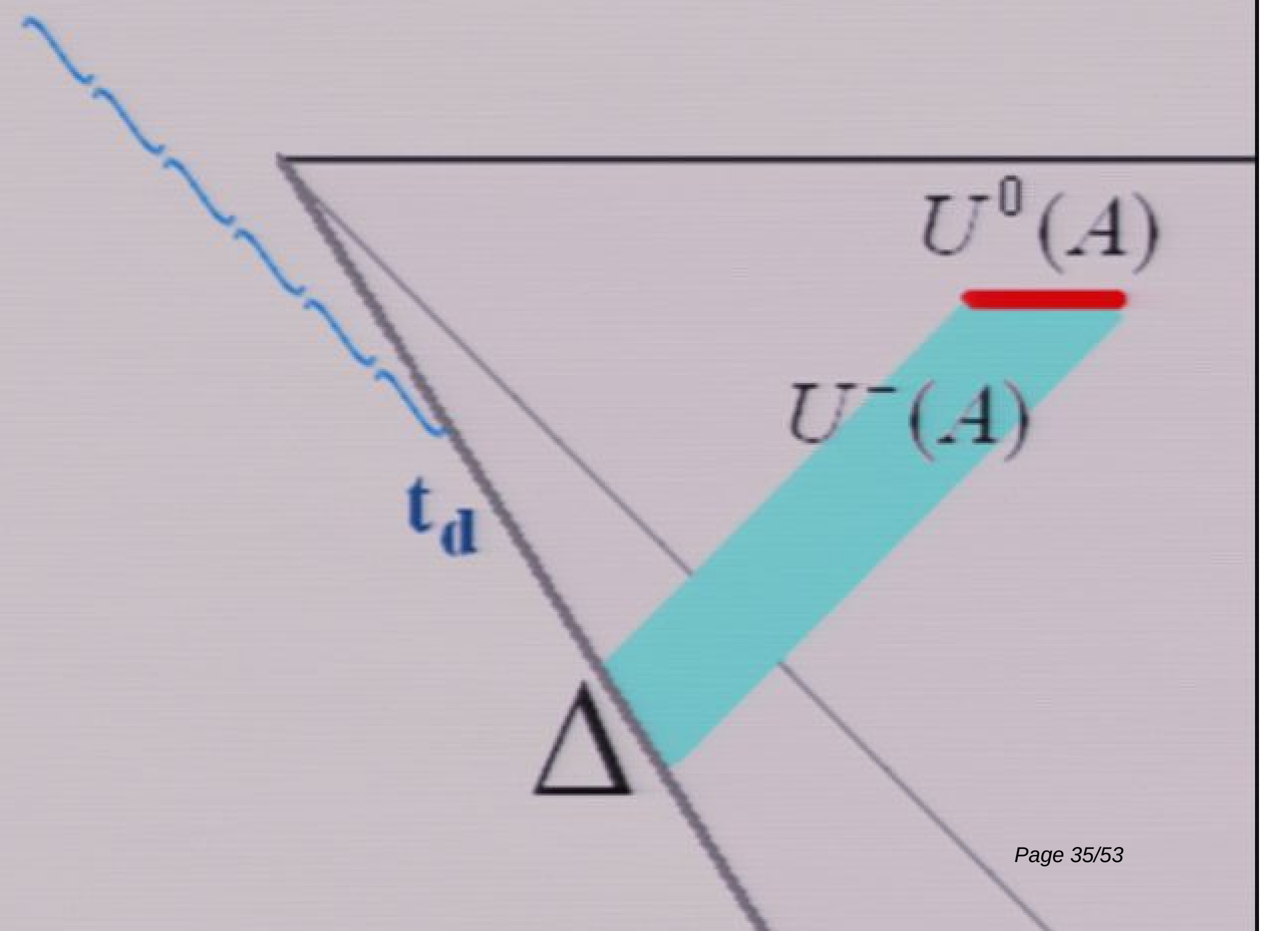
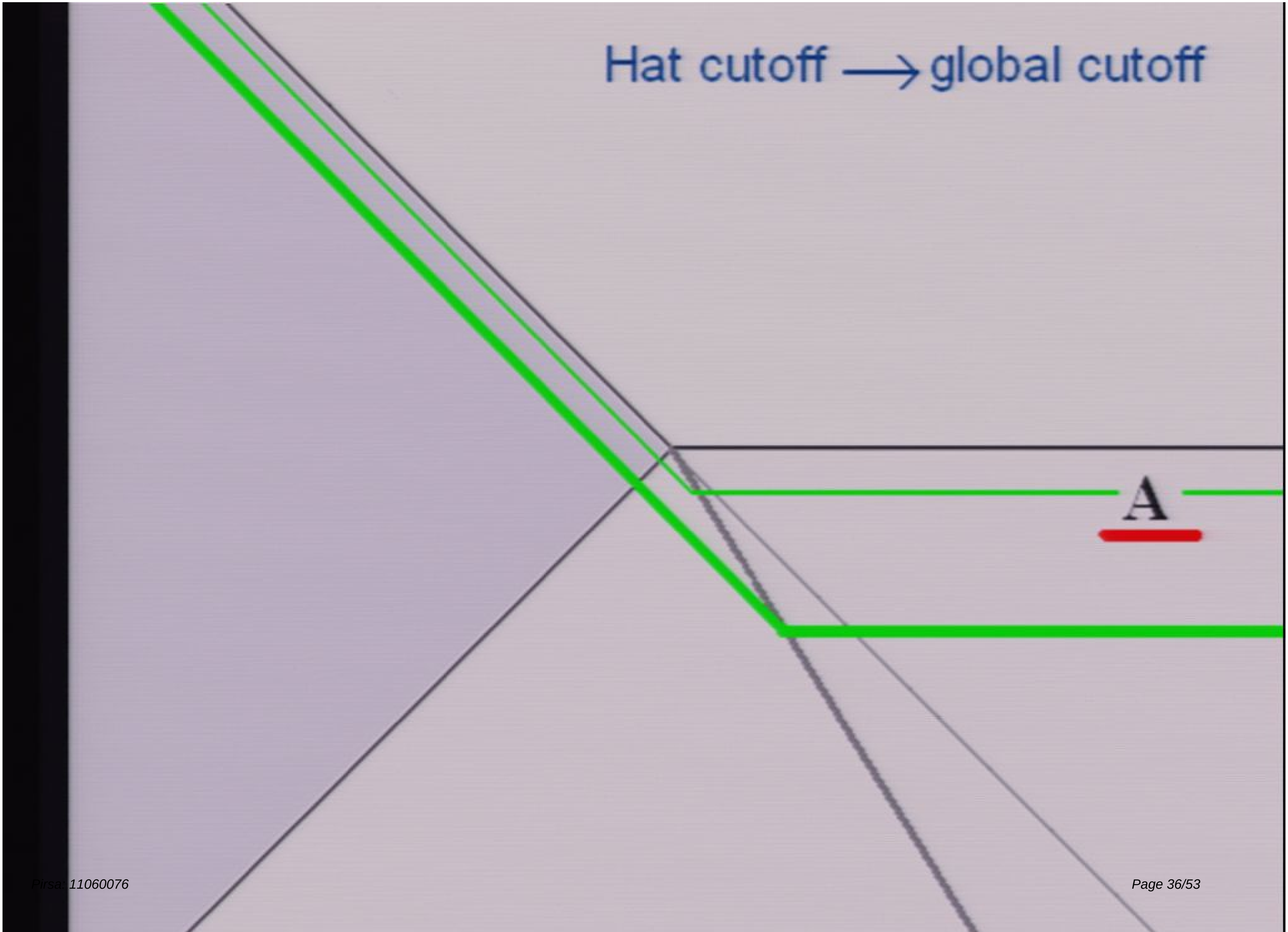
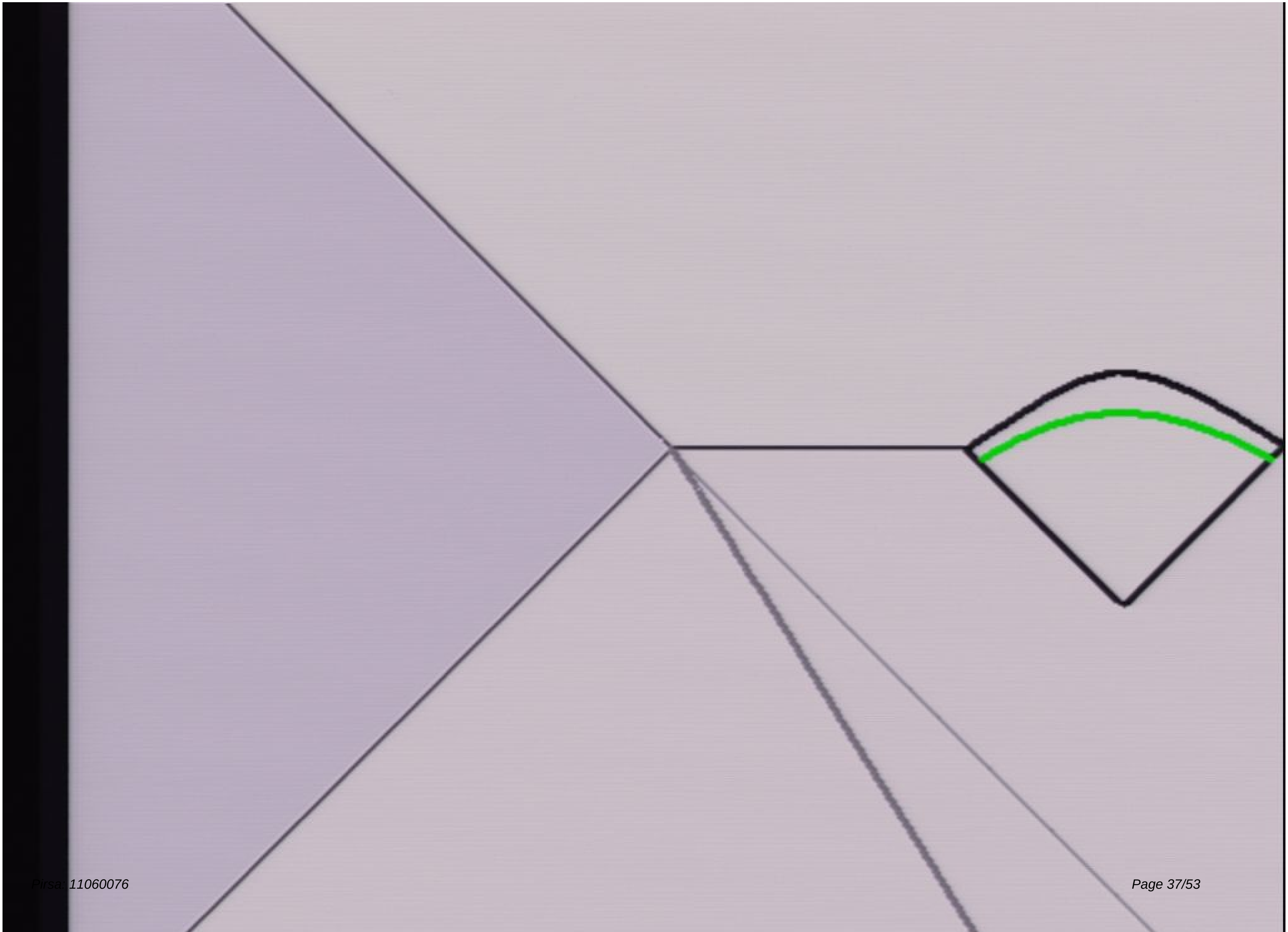
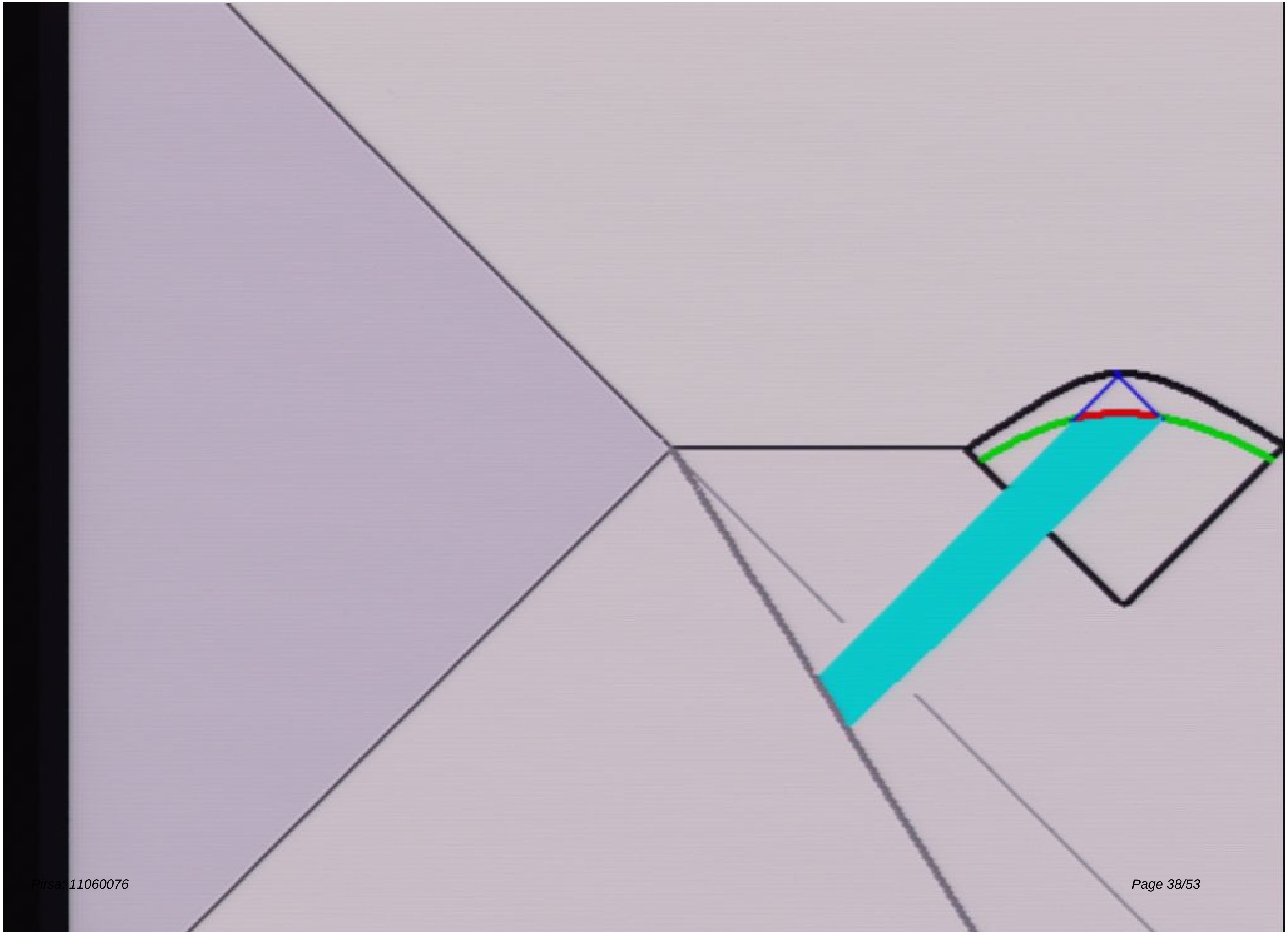
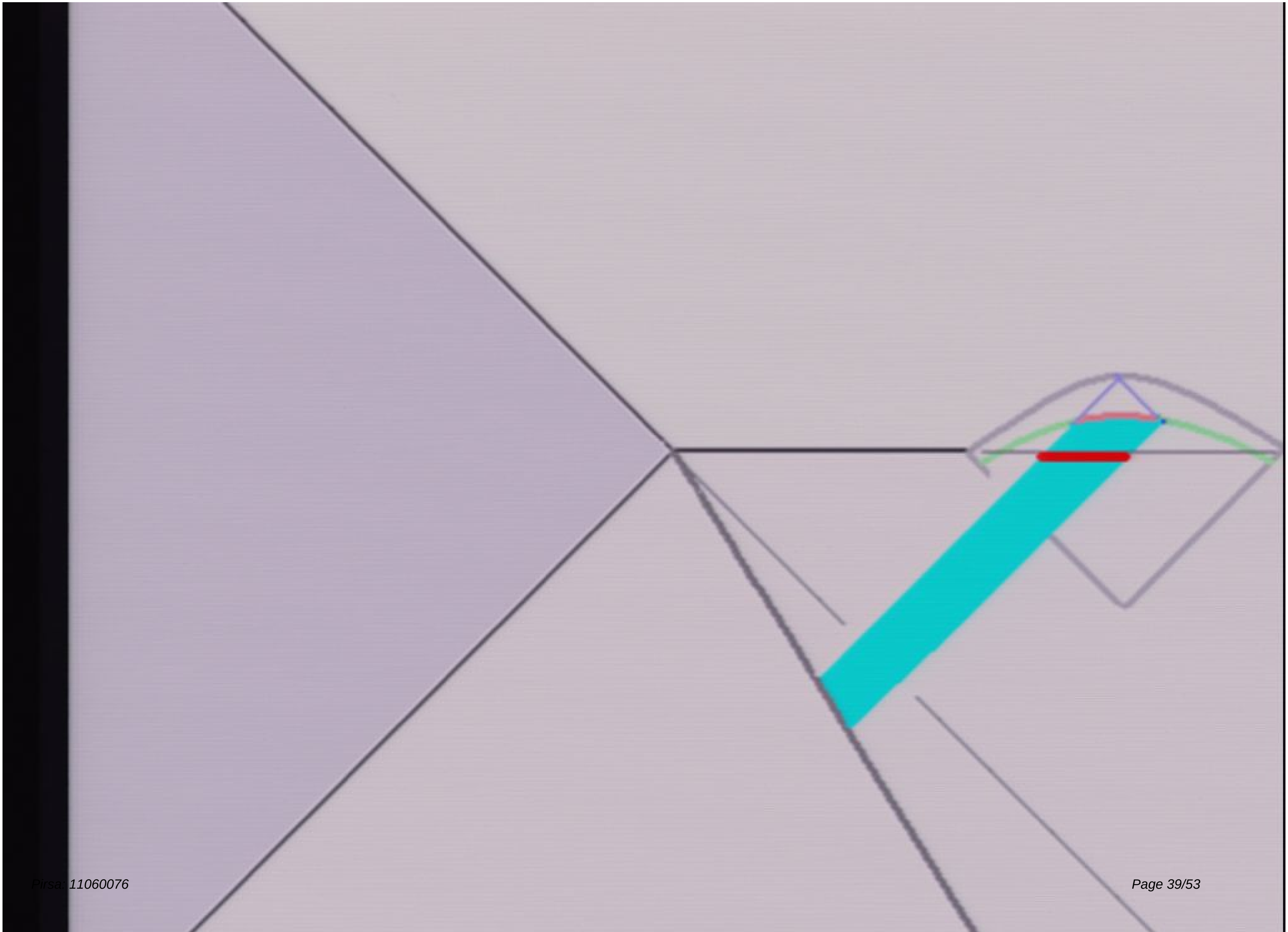
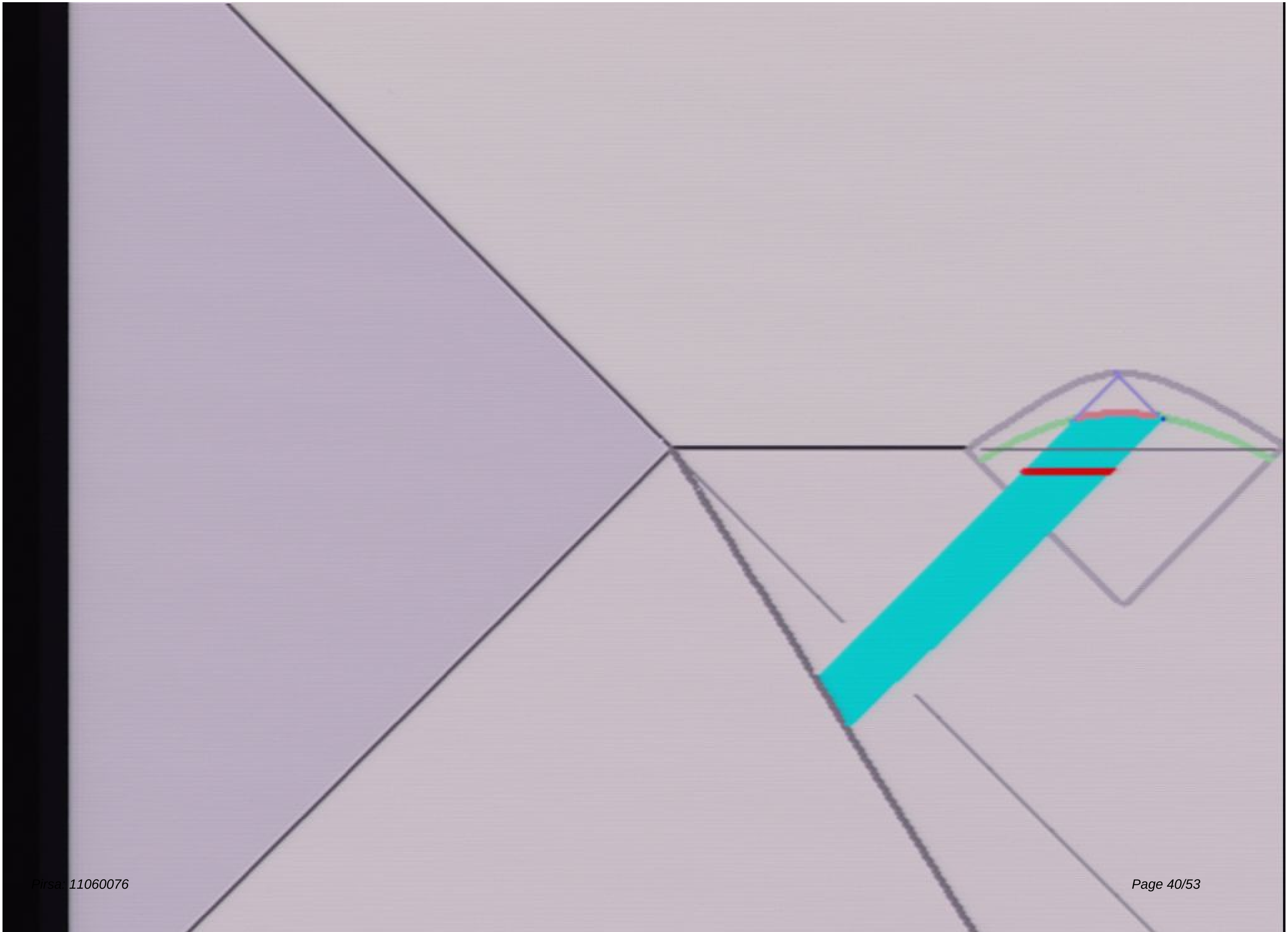


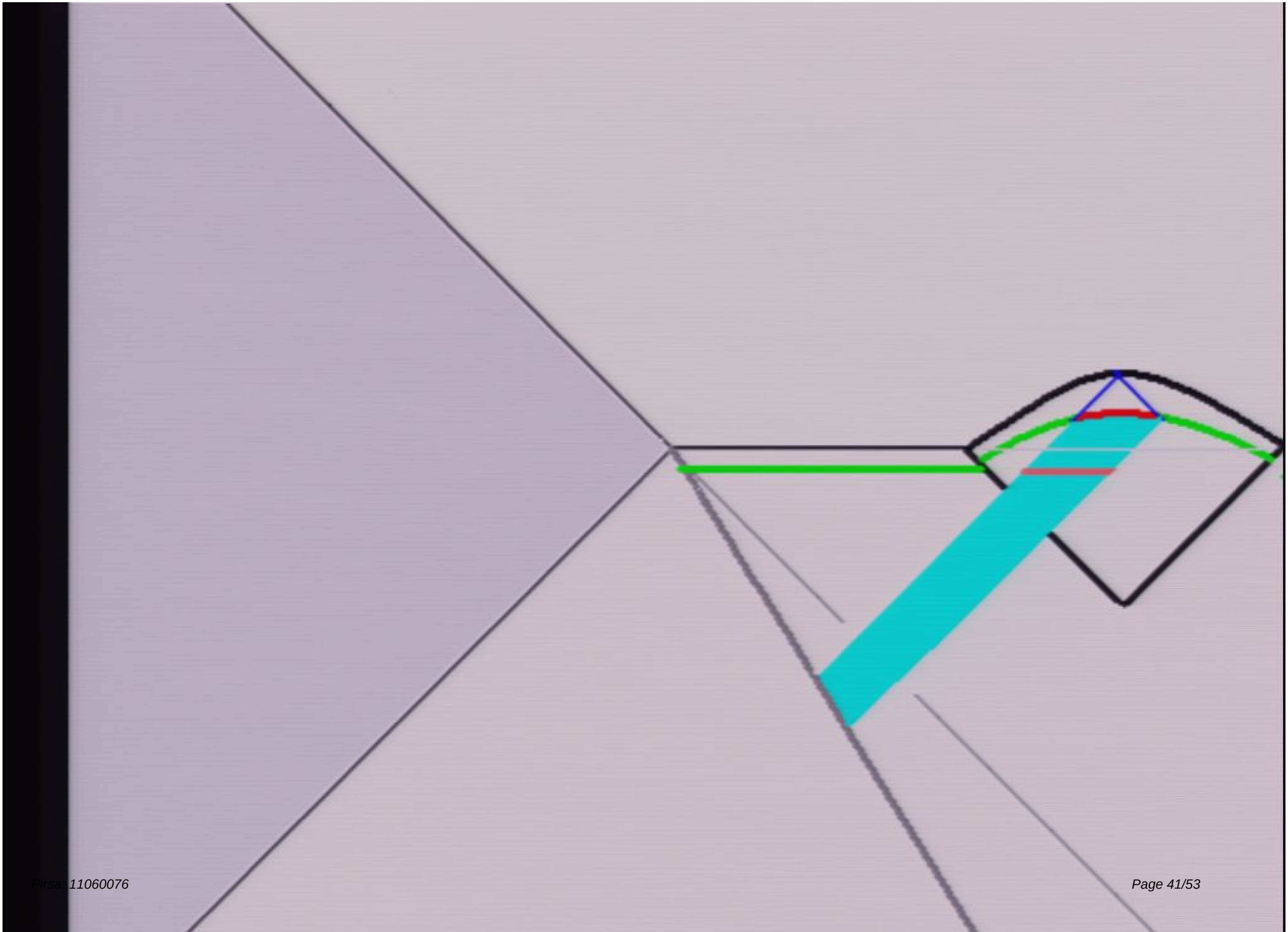

Hat cutoff → global cutoff
A

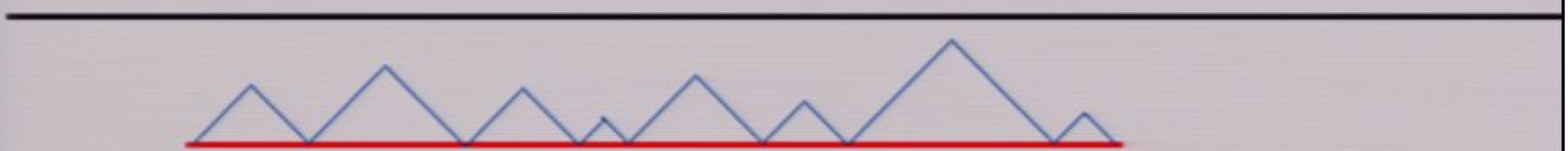




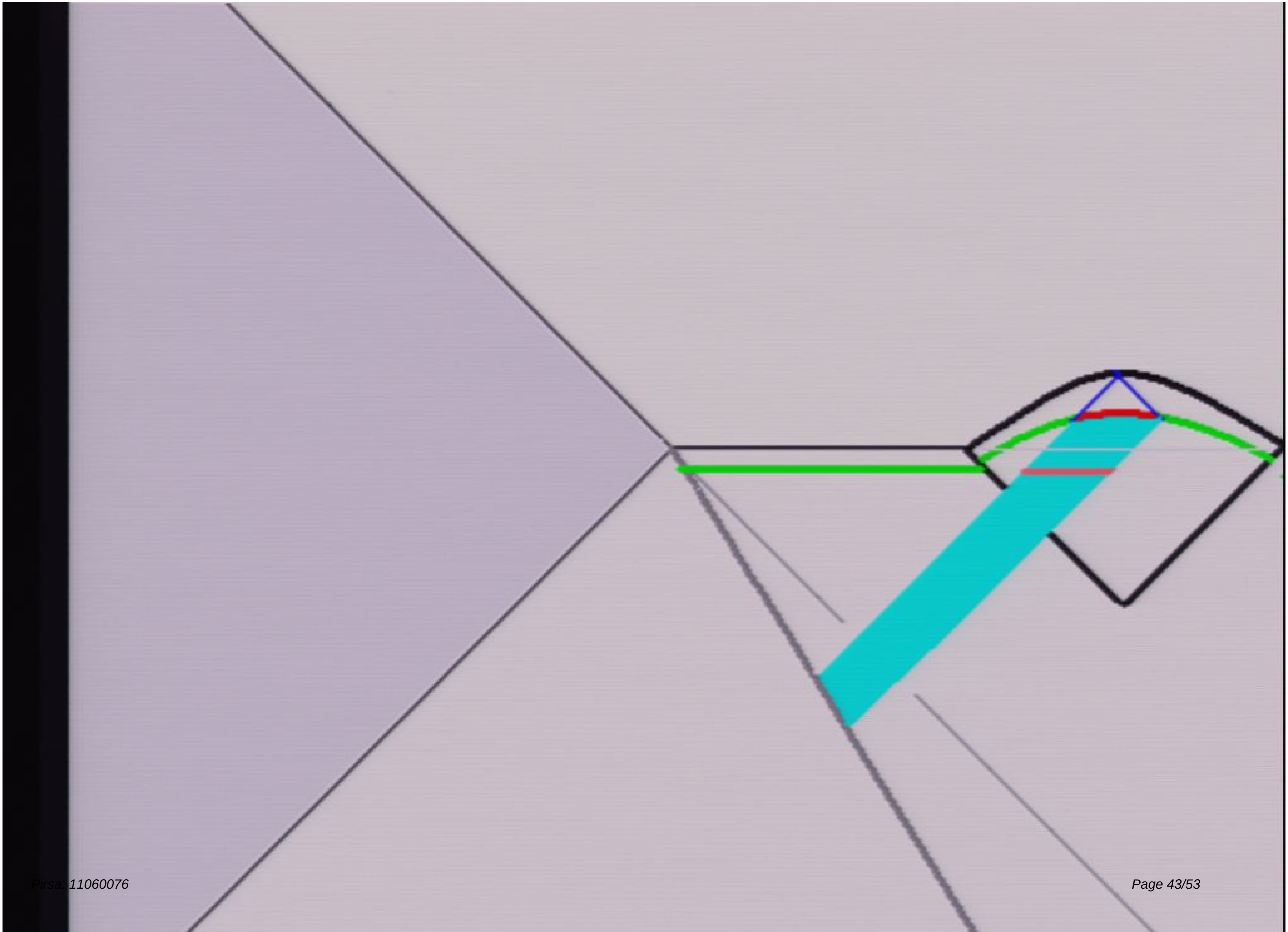


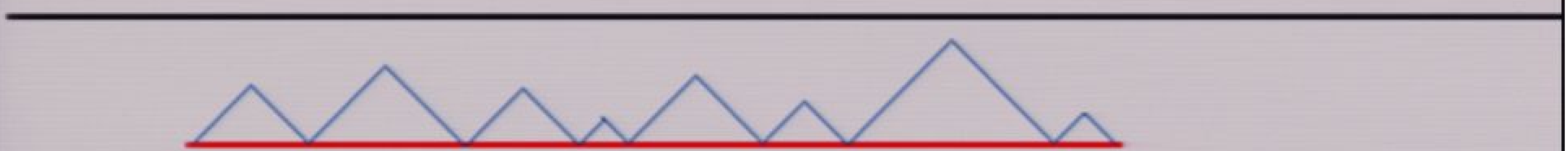






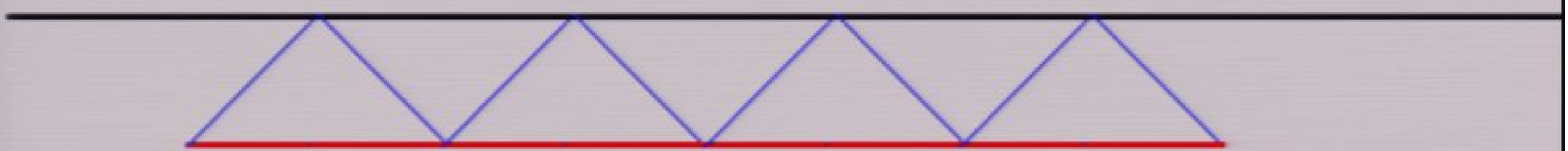
$$S < \sum_{lightsheets} Area$$





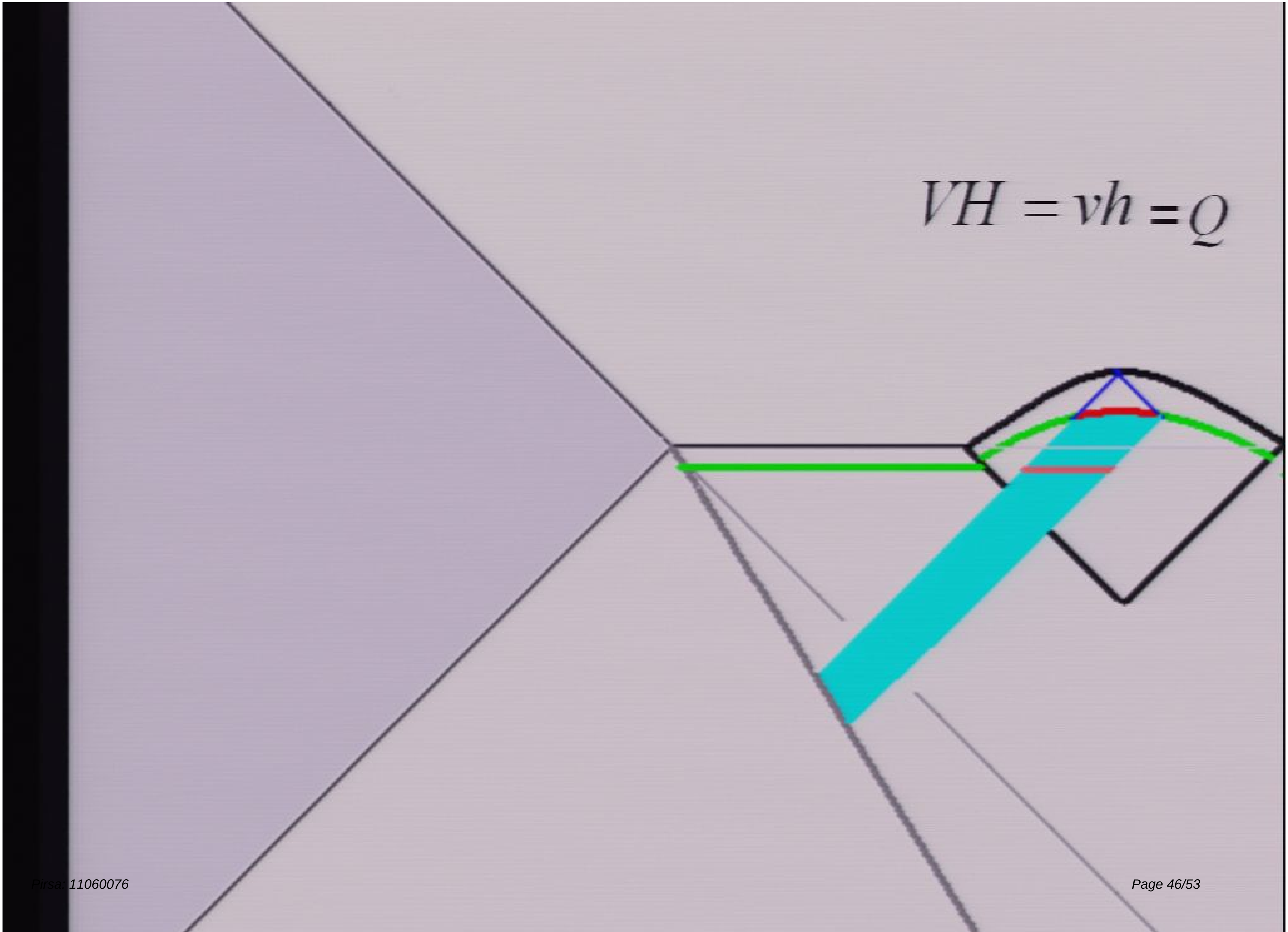
$$S < \sum_{lightsheets} Area$$

Best bound



$$S < (VH^3) \times (H^{-2})$$

$$S_{\max} = VH$$


$VH = vh = Q$

This is a special case of a class of cutoffs which includes the "scale-factor cutoff" (De Simone, Guth, Salem, Vilenkin),

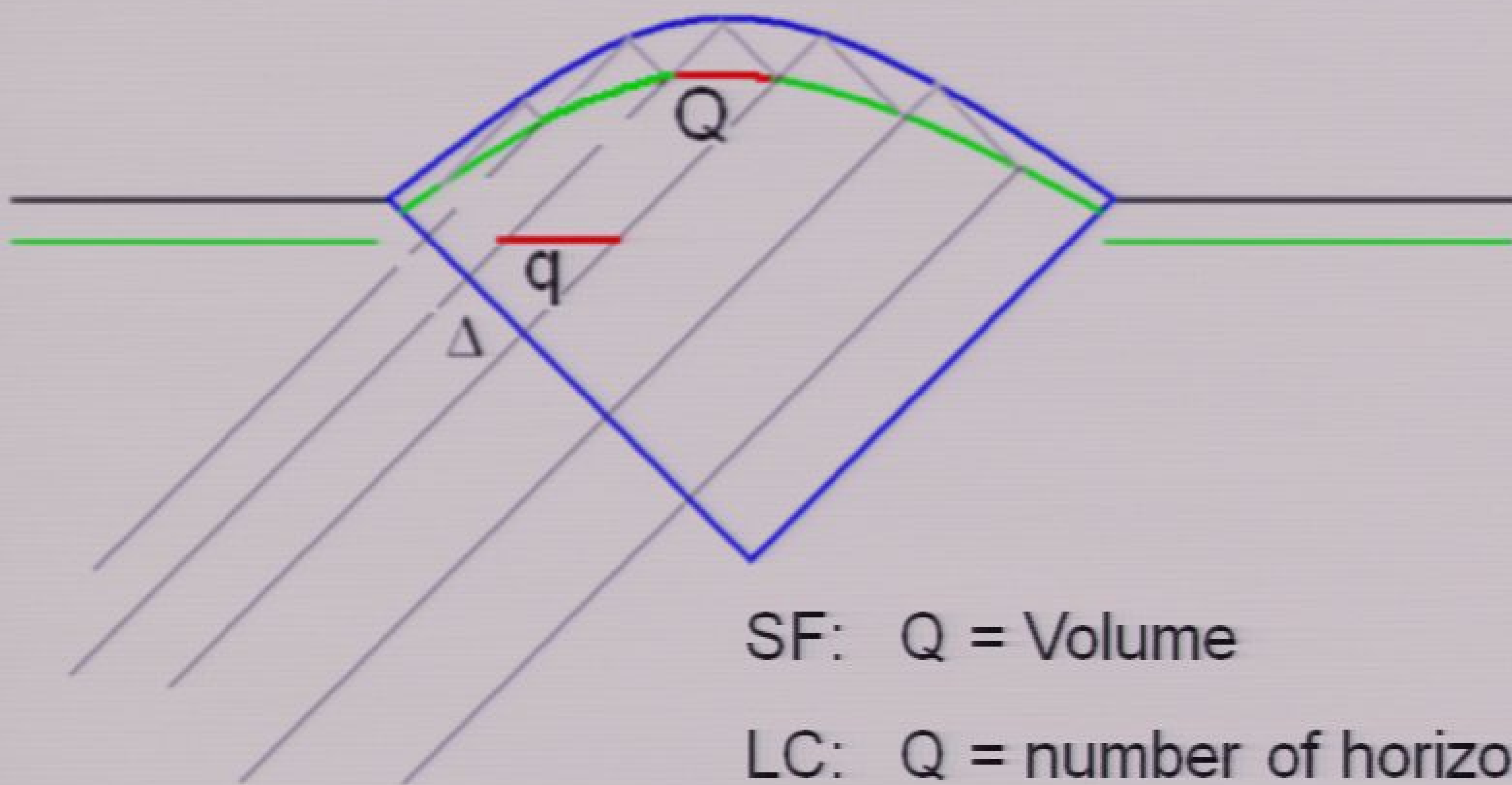
the "light-cone-time cutoff", (Bousso, Freivogel, Leichenauer, Rosenhaus),

and the "information cutoff": (Shenker, Stanford. Susskind)

$$SFC: \quad V = v$$

$$LCTC: \quad VH^3 = vh^3$$

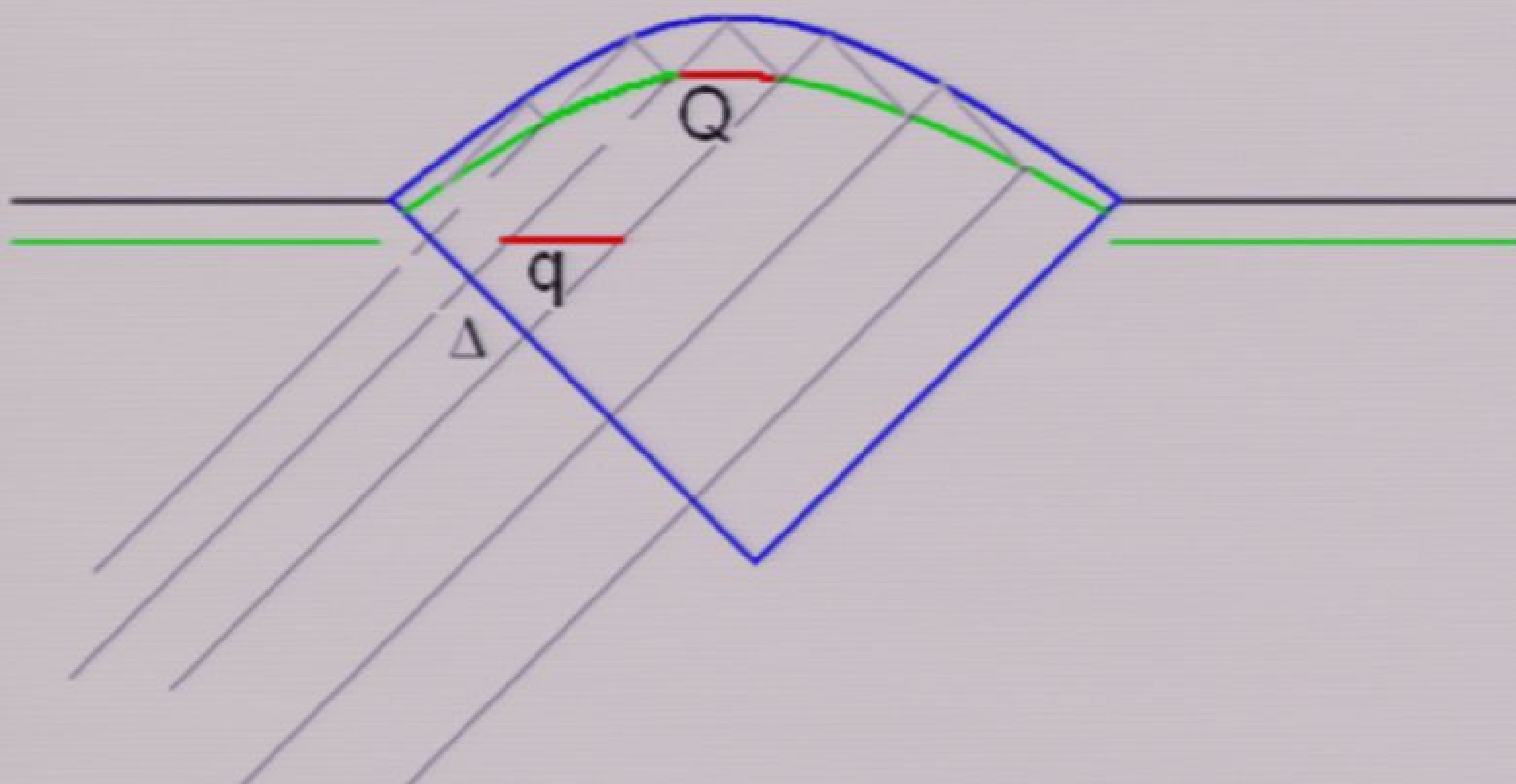
$$IC: \quad VH = vh$$

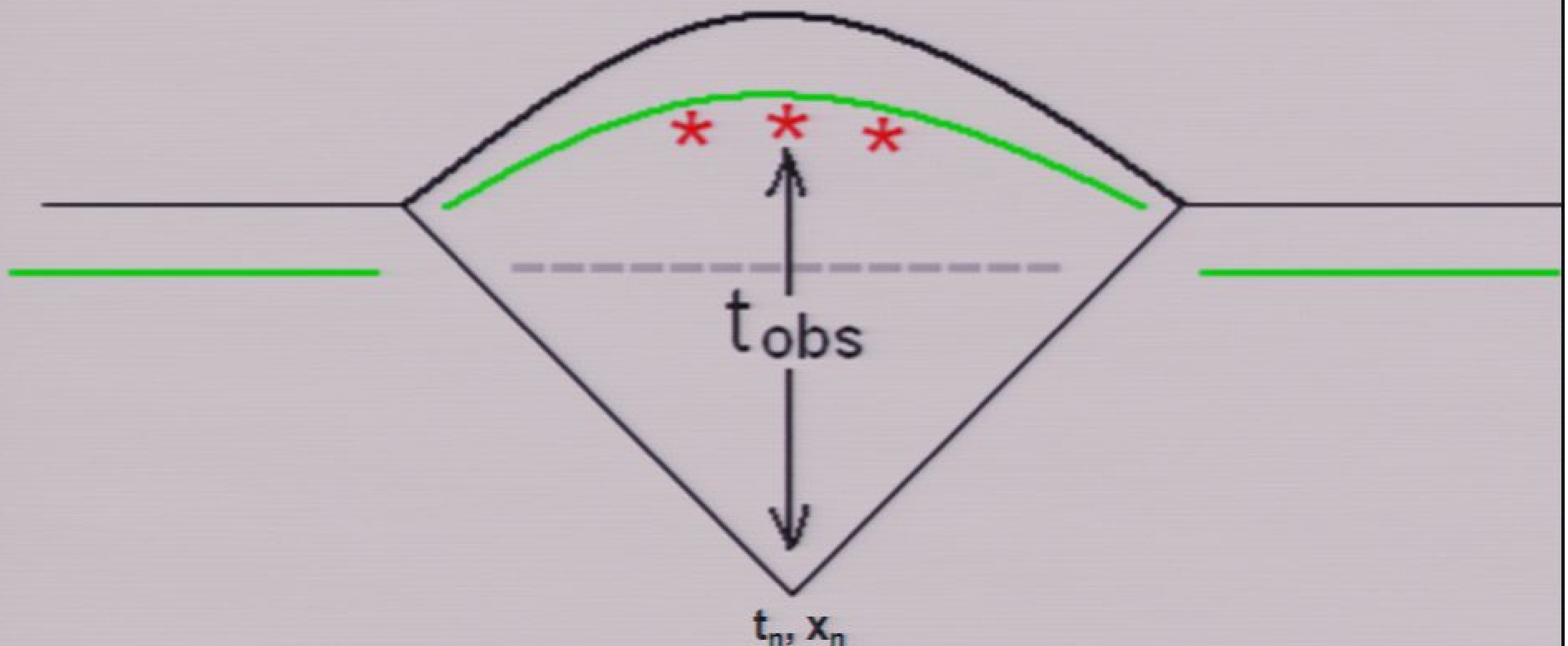


SF: Q = Volume

LC: Q = number of horizon volumes

IC: Q = maximum entropy

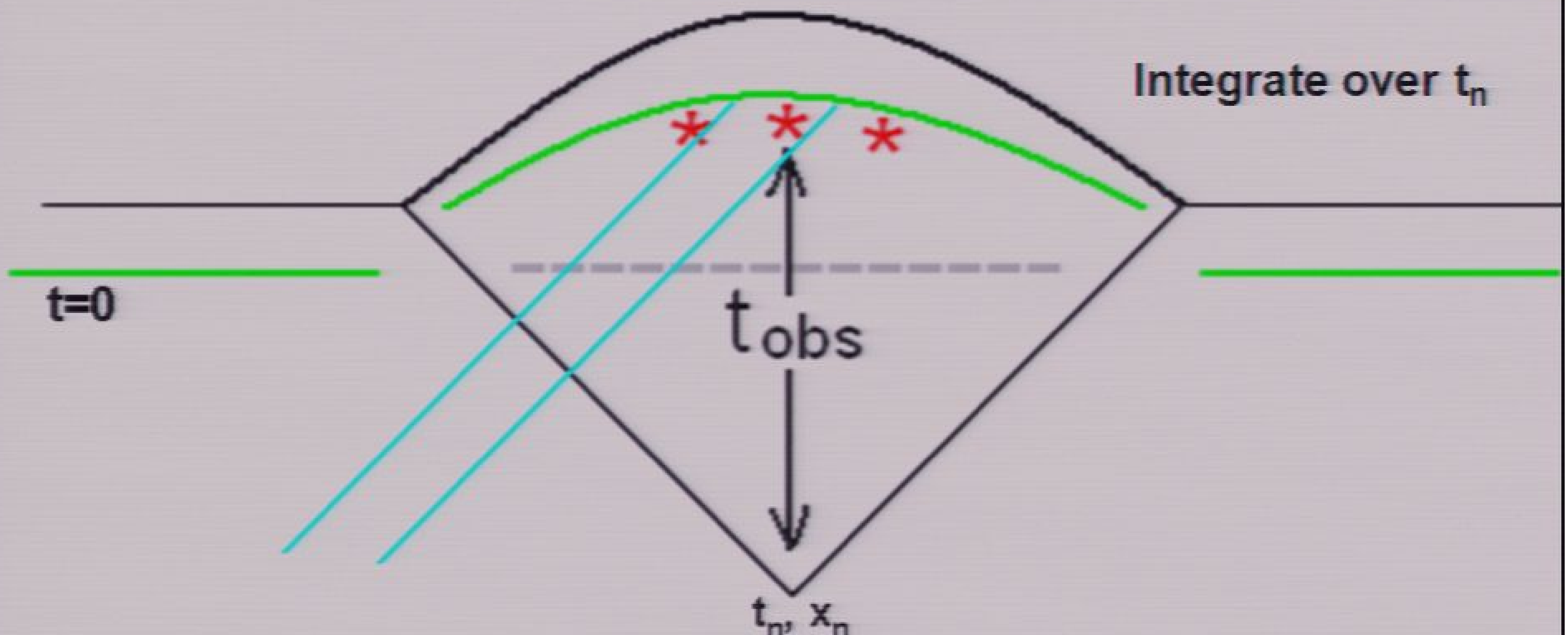

Q
q
Δ



t_{obs}
t_n, x_n

$S_{exc} \sim \; H \exp(-3Ht_n)$

$S_{pb} \sim \; h \; \exp(3ht_{obs})$



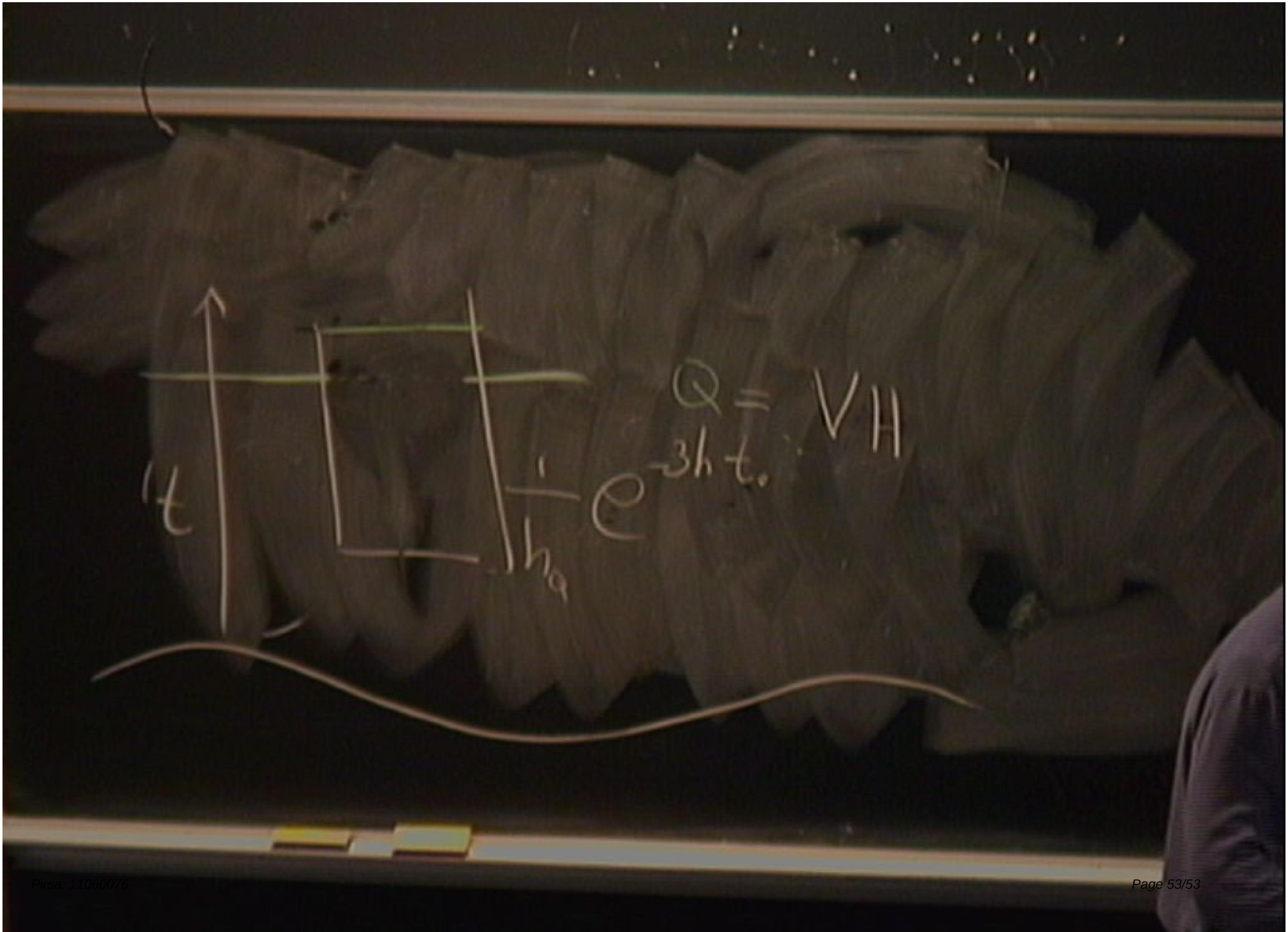
Integrate over x with volume element

$$\exp(\,3Ht_n) \;=\; \frac{h}{H}\exp(\,-3ht_{obs}\,)$$

$$SF: \quad P(h,t_o) = e^{-3ht_o}$$

$$LC: \quad P(h,t_o) = \frac{e^{-3ht_o}}{h^3}$$

$$IC: \quad P(h,t_o) = \frac{e^{-3ht_o}}{h}$$


Q = VH
e-3ht₀
t
ha