Title: Beyond the Standard (cosmological) Model

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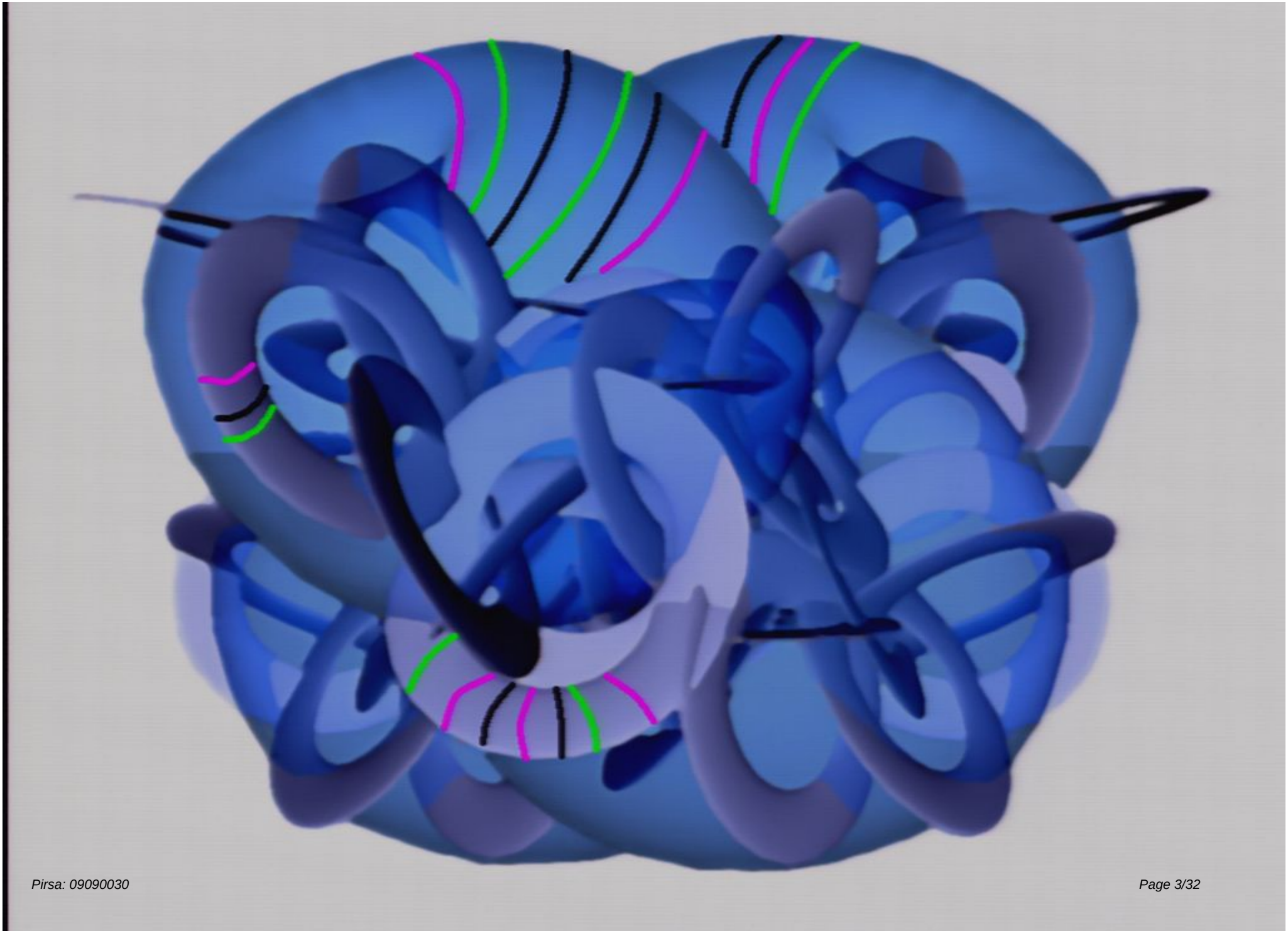
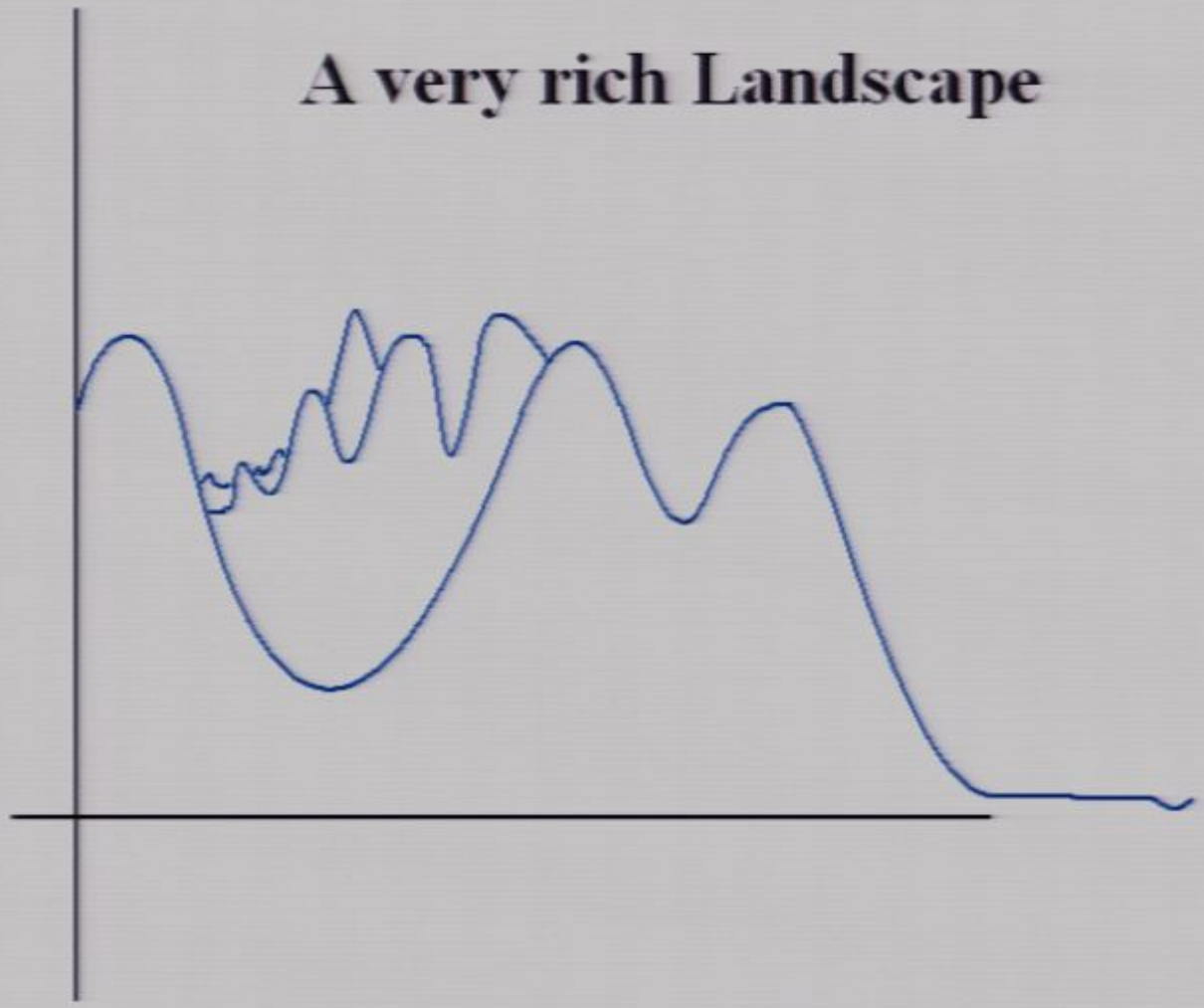
Abstract: The Standard model of Cosmology consists of a package of ideas that include Cold Dark Matter, Inflation, and the existence of a small Cosmological Constant. While there is no consensus about what lies beyond the Standard Model, there is a leading candidate that also includes a small package of ideas: A Landscape of connected vacua: the idea that the universe started out with a large energy density, and Coleman DeLuccia Tunneling between vacua. An additional idea that comes from string theory and black hole physics is the Holographic Principle. I will explain how the various ingredients for a "post-standard-model" standard model fit together.

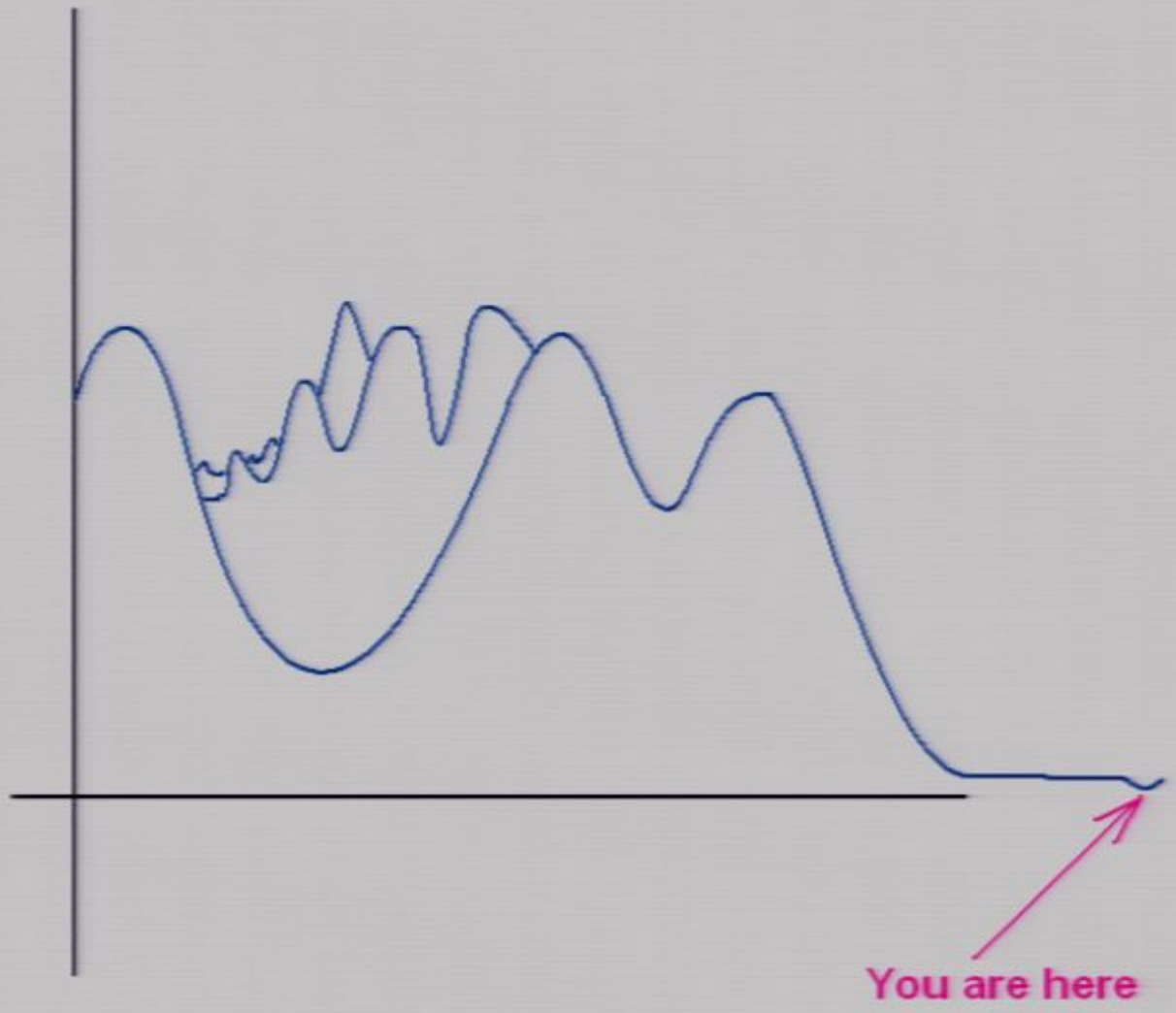
Beyond the Standard Model (Λ, CDM, I) ?

Why do ~~we~~ I think there is anything beyond the SM?

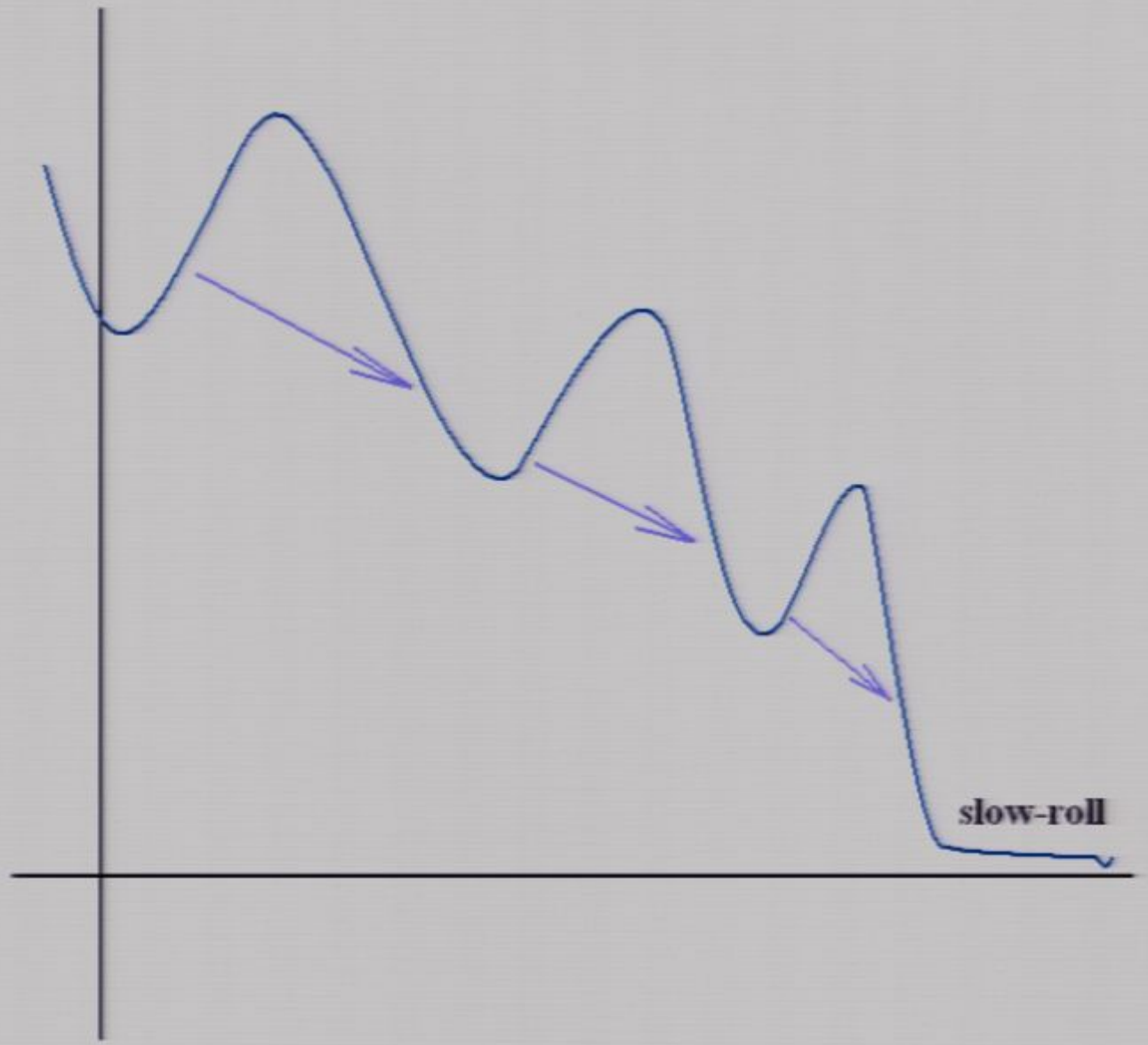


A very rich Landscape

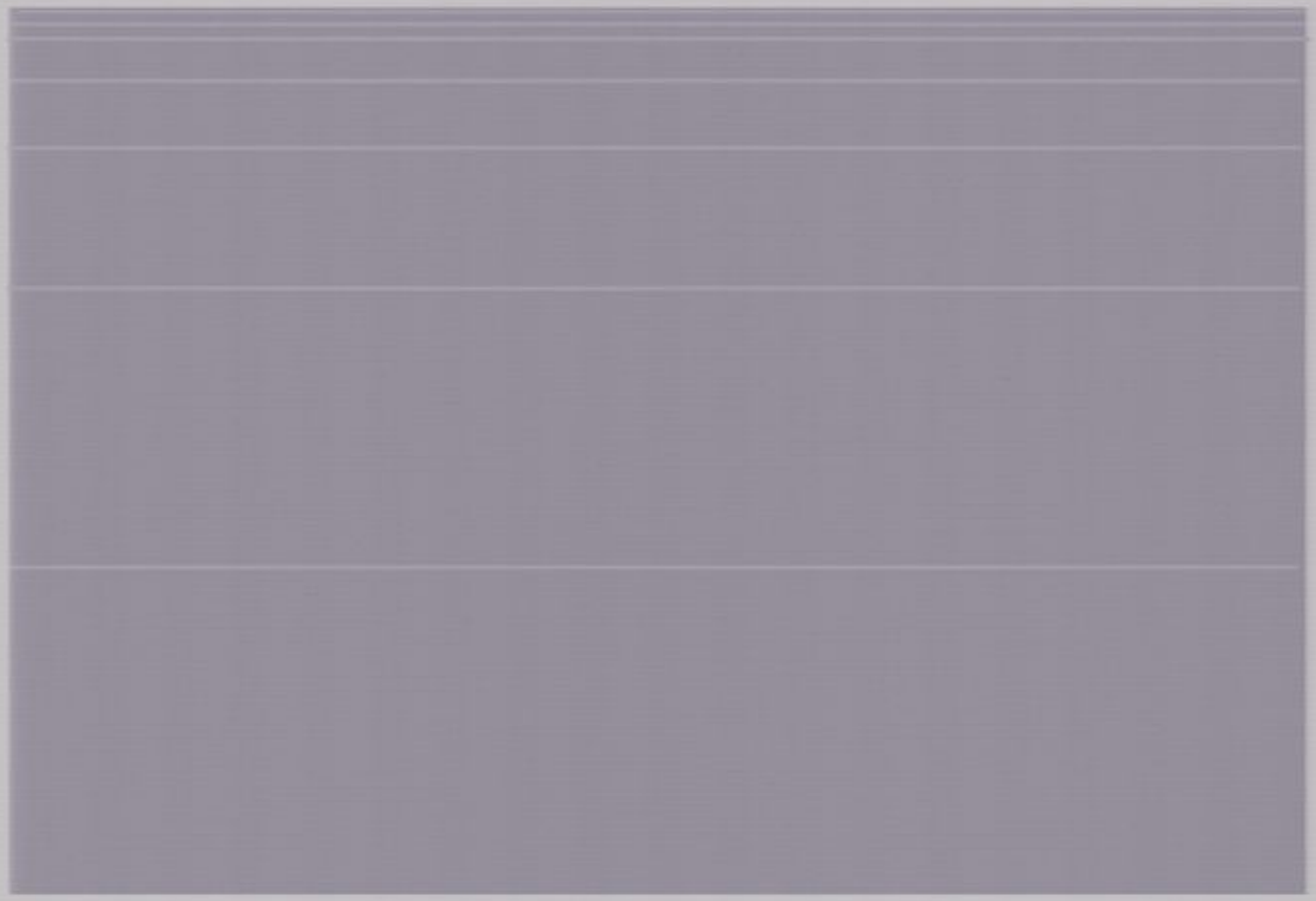


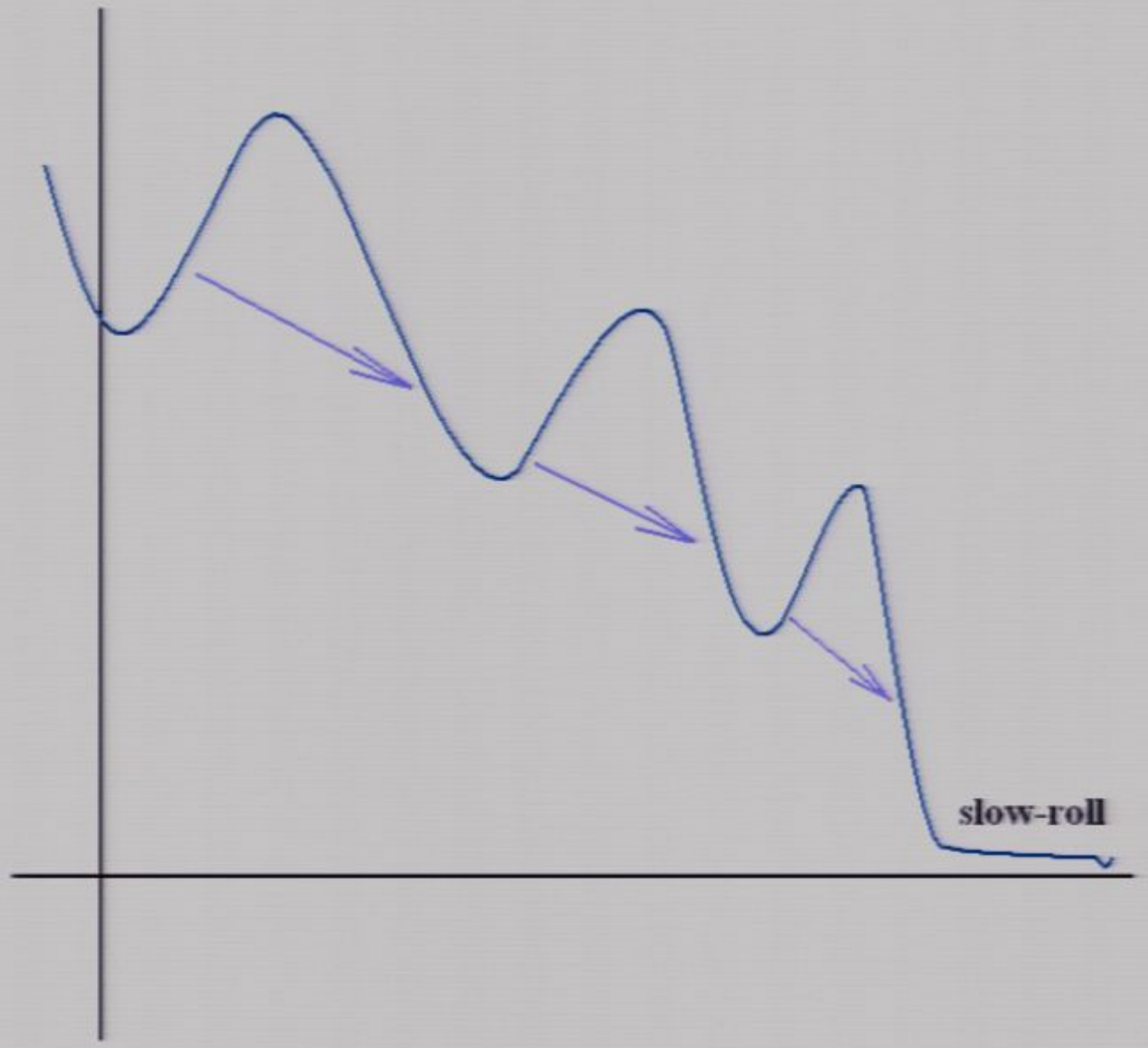

You are here

We started here


slow-roll

Series or parallel?

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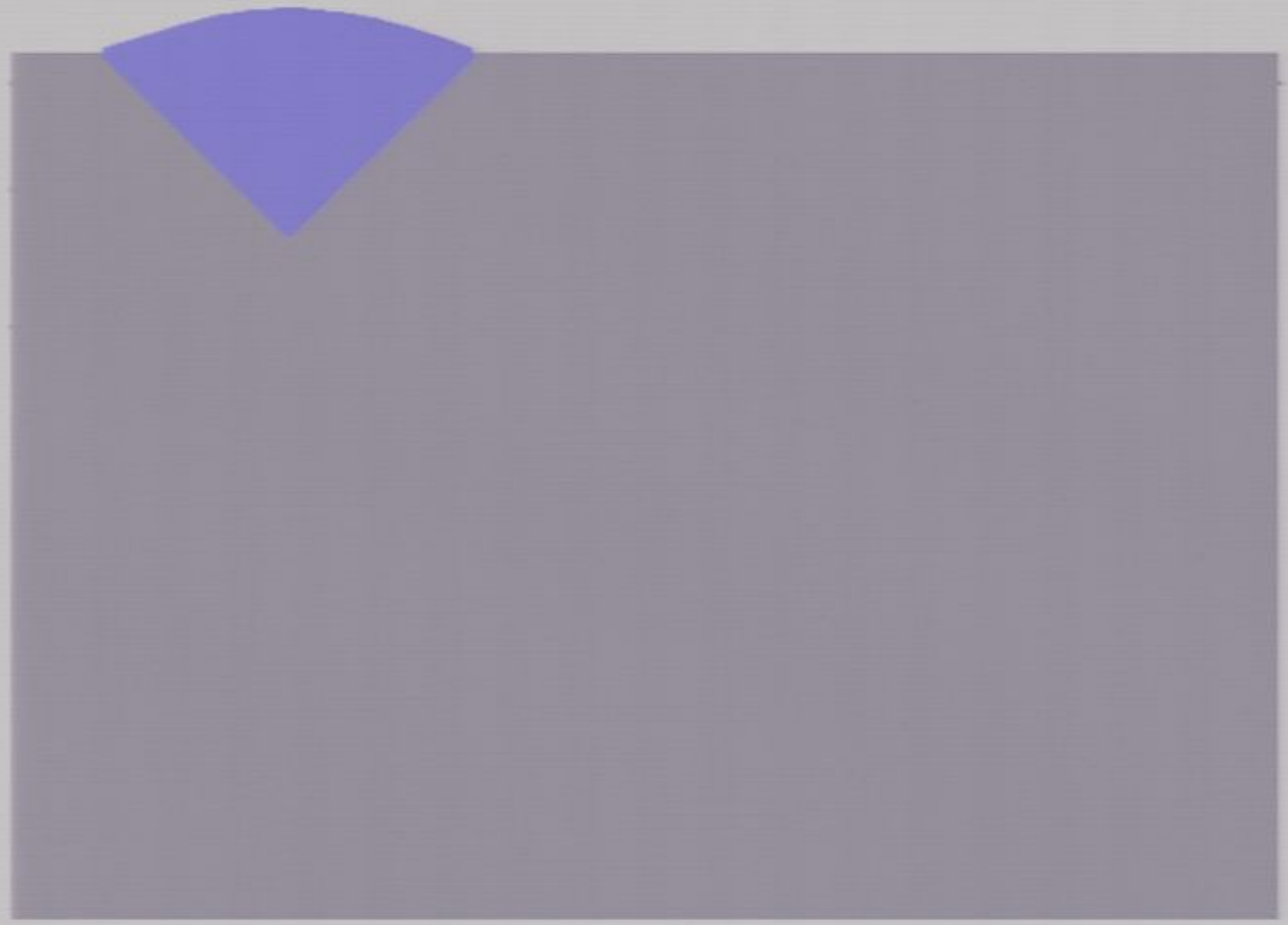

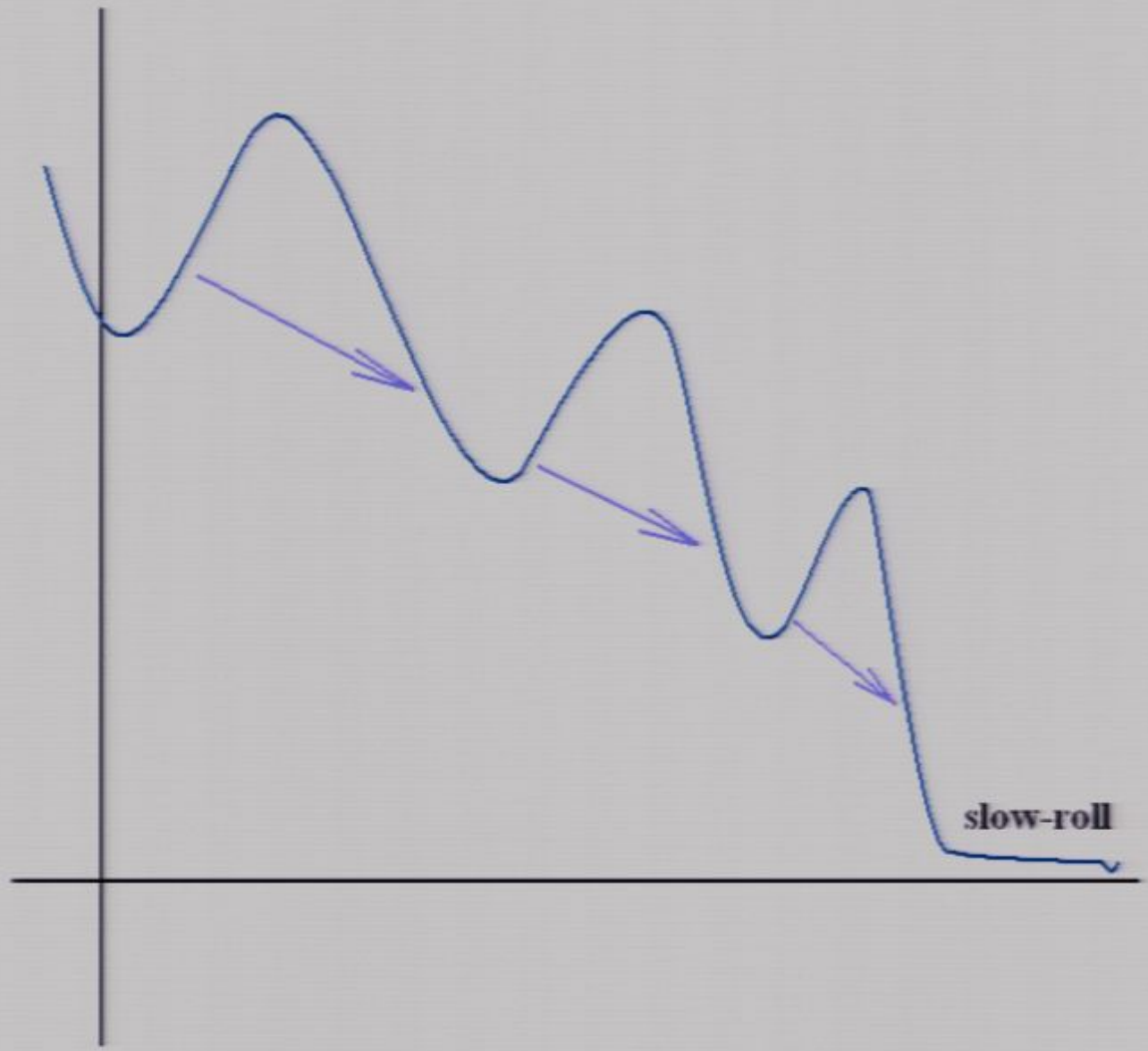
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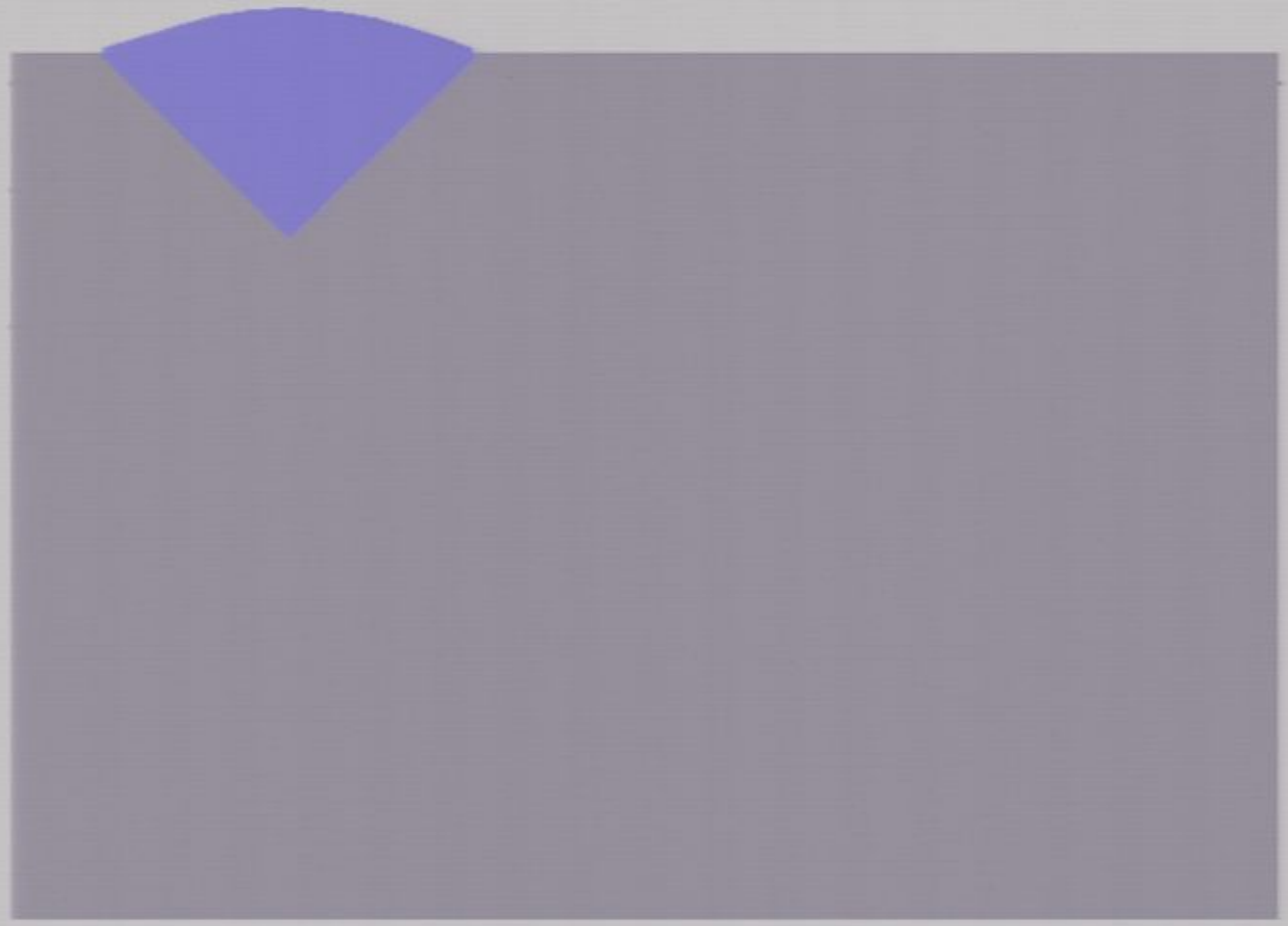
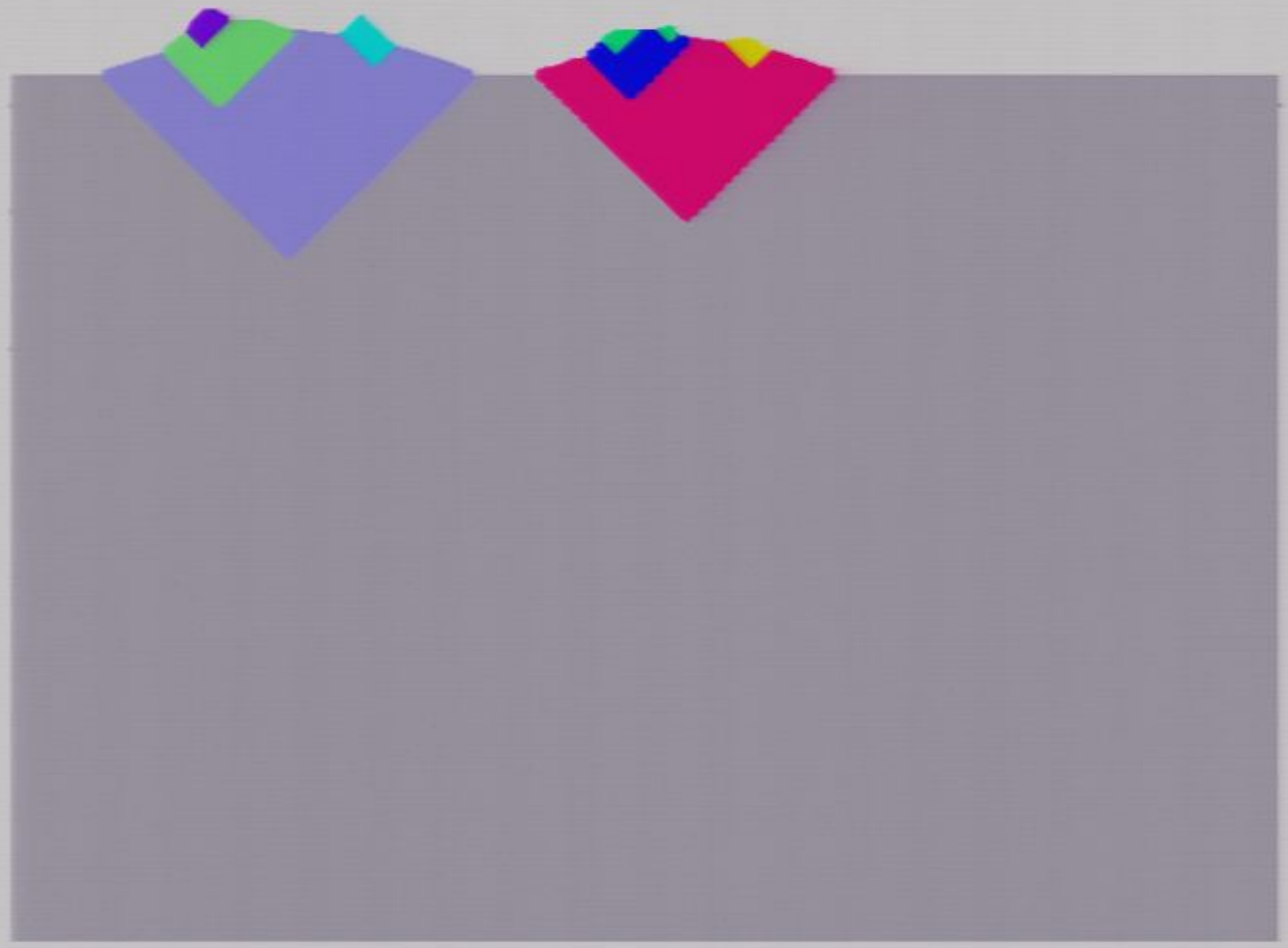


Series or parallel?



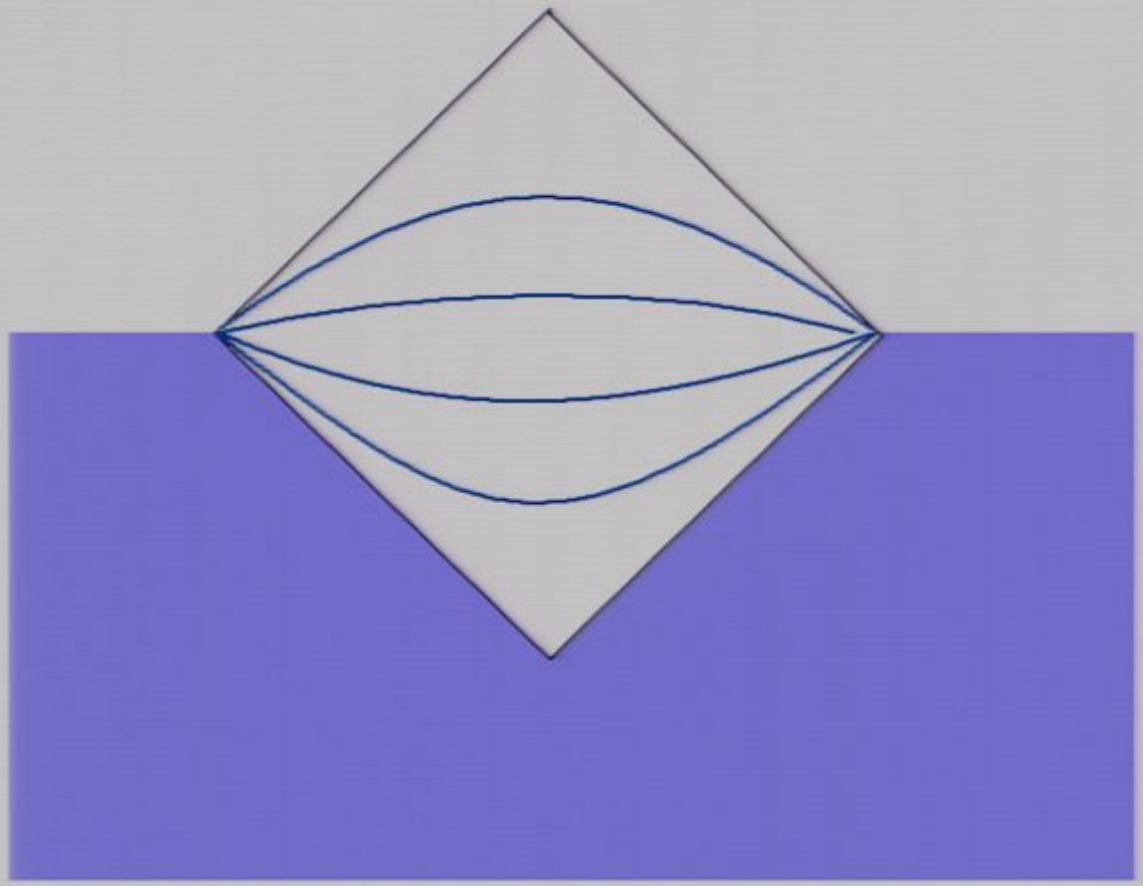
A

A positive CC is a form of long range repulsion.

If the CC were much larger than it is (10^{-123}) structure formation would have been impossible.

Why slow-roll inflation?

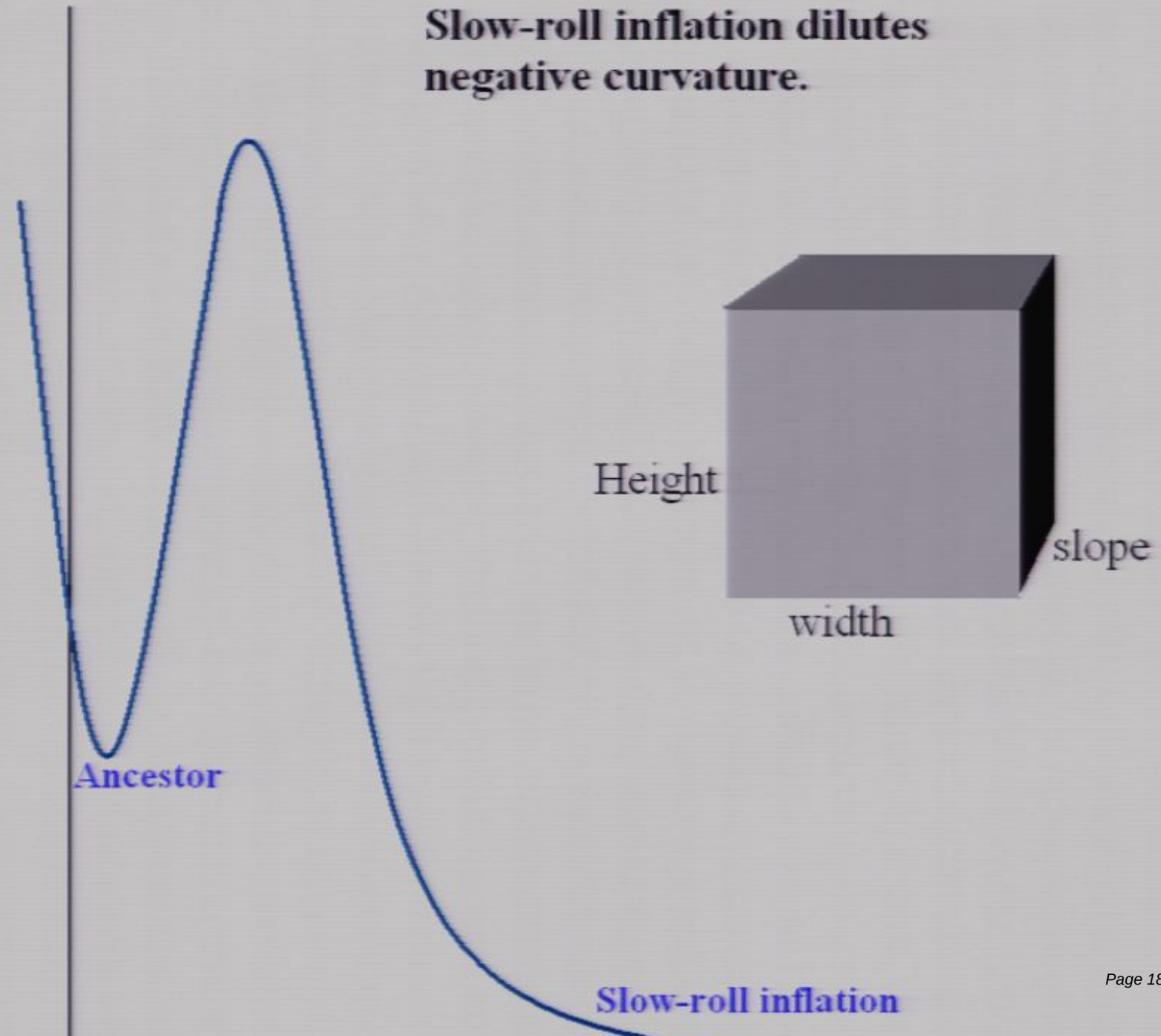
The interior of bubbles are negatively-curved, open, infinite, FRW universes.

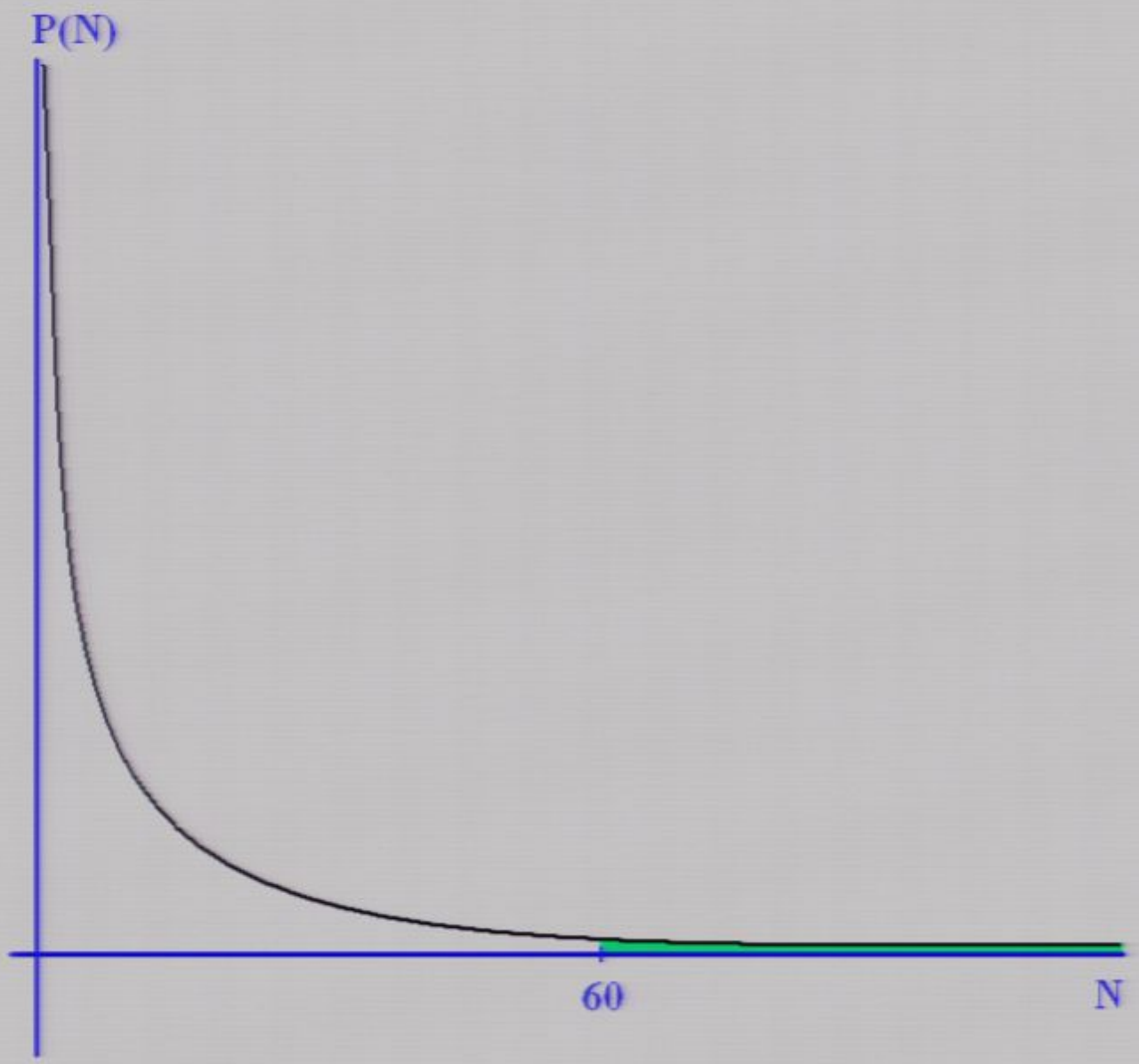


Negative curvature means everything is moving with > escape velocity.

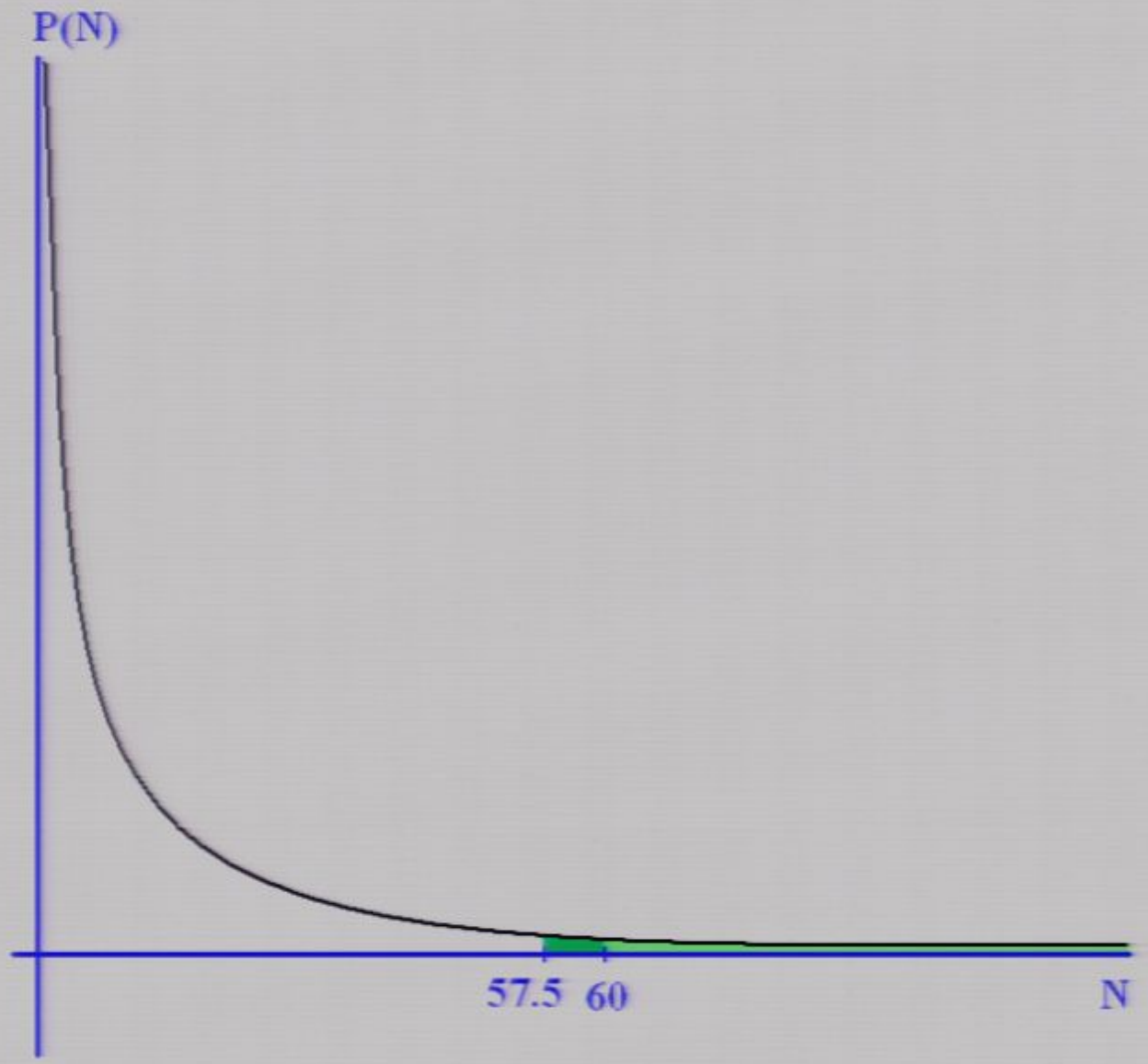
Too much negative curvature will prevent structure formation.

Slow-roll inflation dilutes negative curvature.



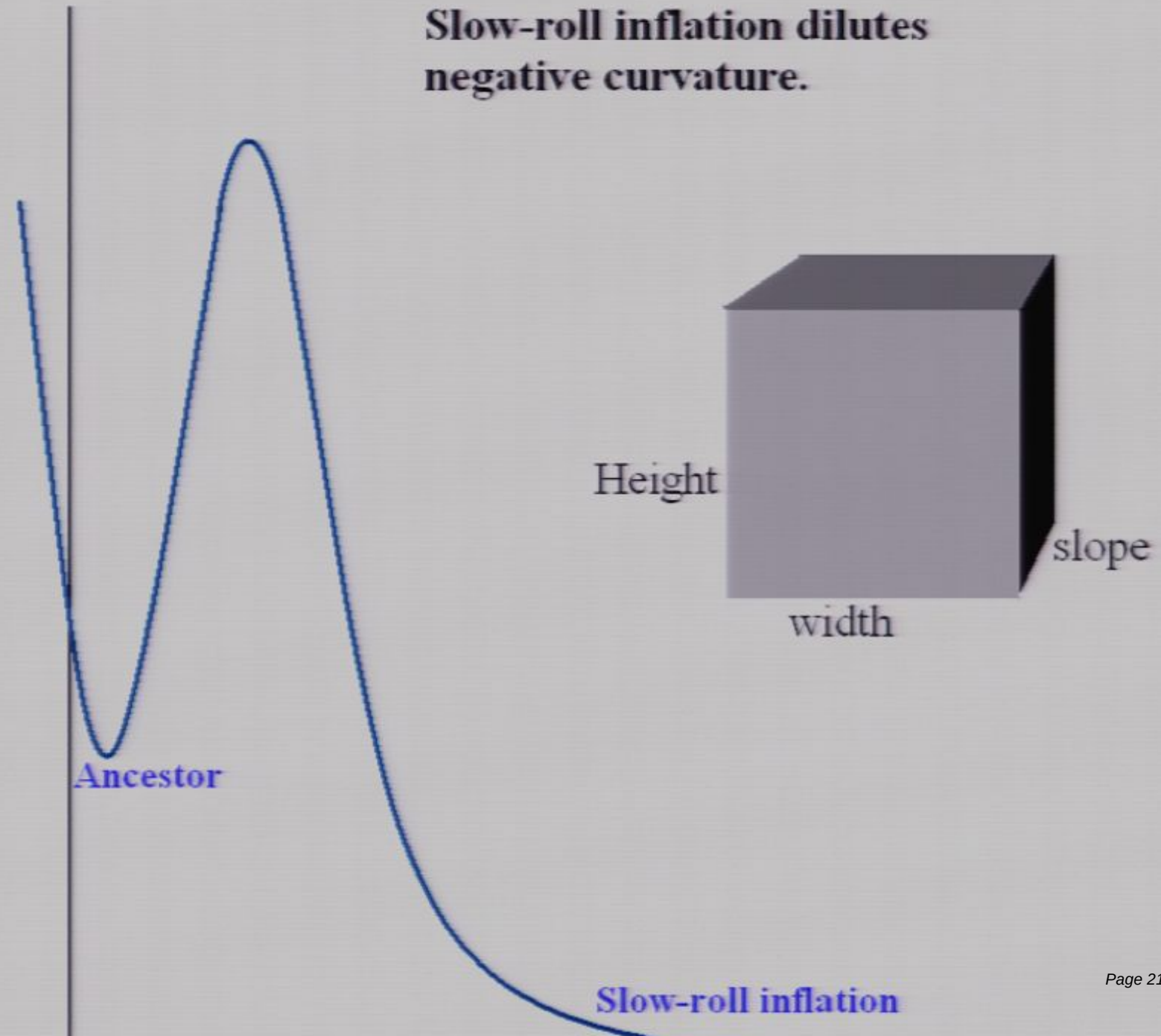


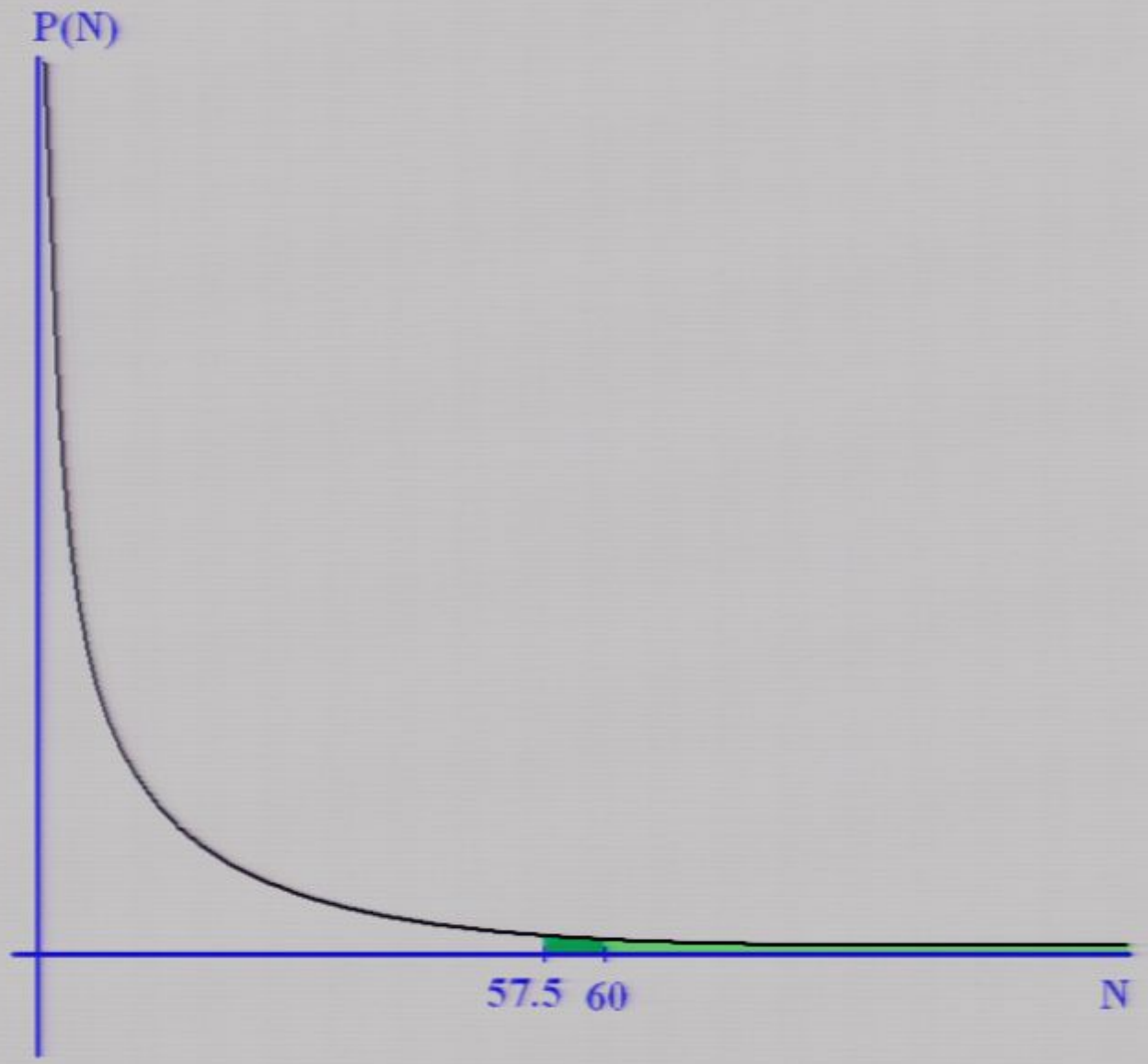
$$P(N > 60) \sim 10^{-12}$$



$$P(N > 60 \mid N > 57.5) \sim .9$$

Slow-roll inflation dilutes negative curvature.





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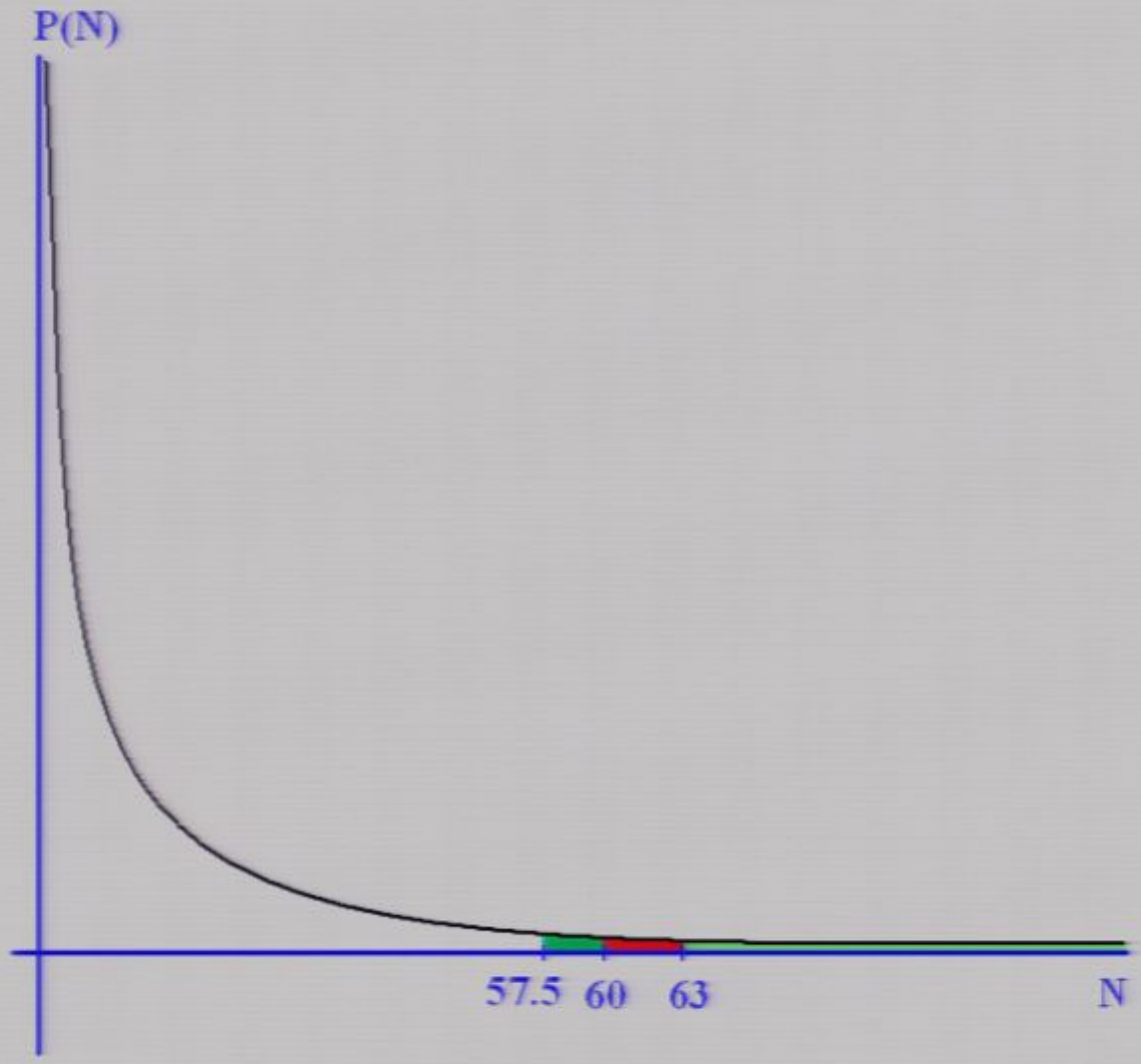
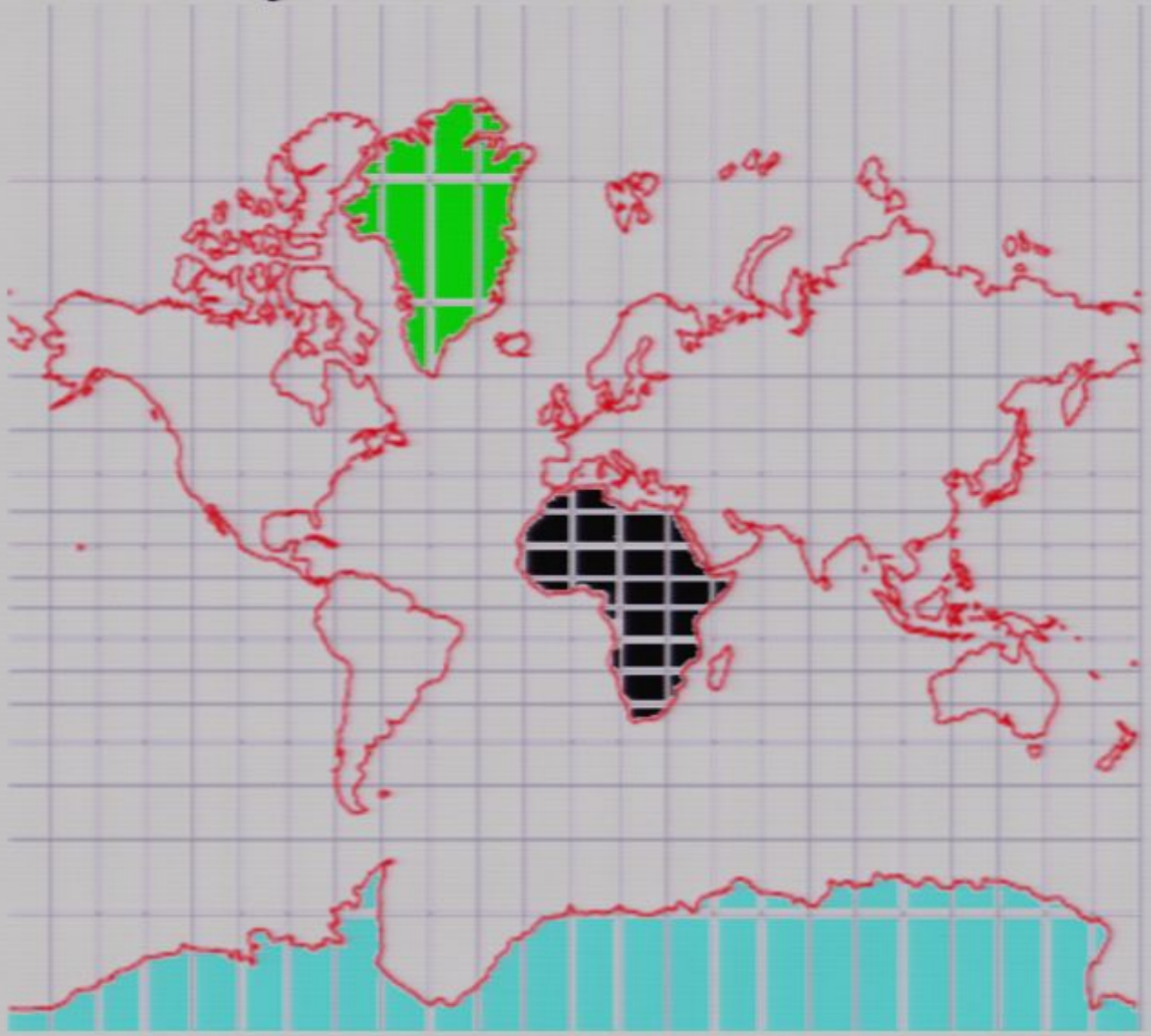


P ~.1

Direct Observation?

- Curvature
- Bubble collisions with our bubble
- Axion signals
- Tensor modes

Spatial Curvature

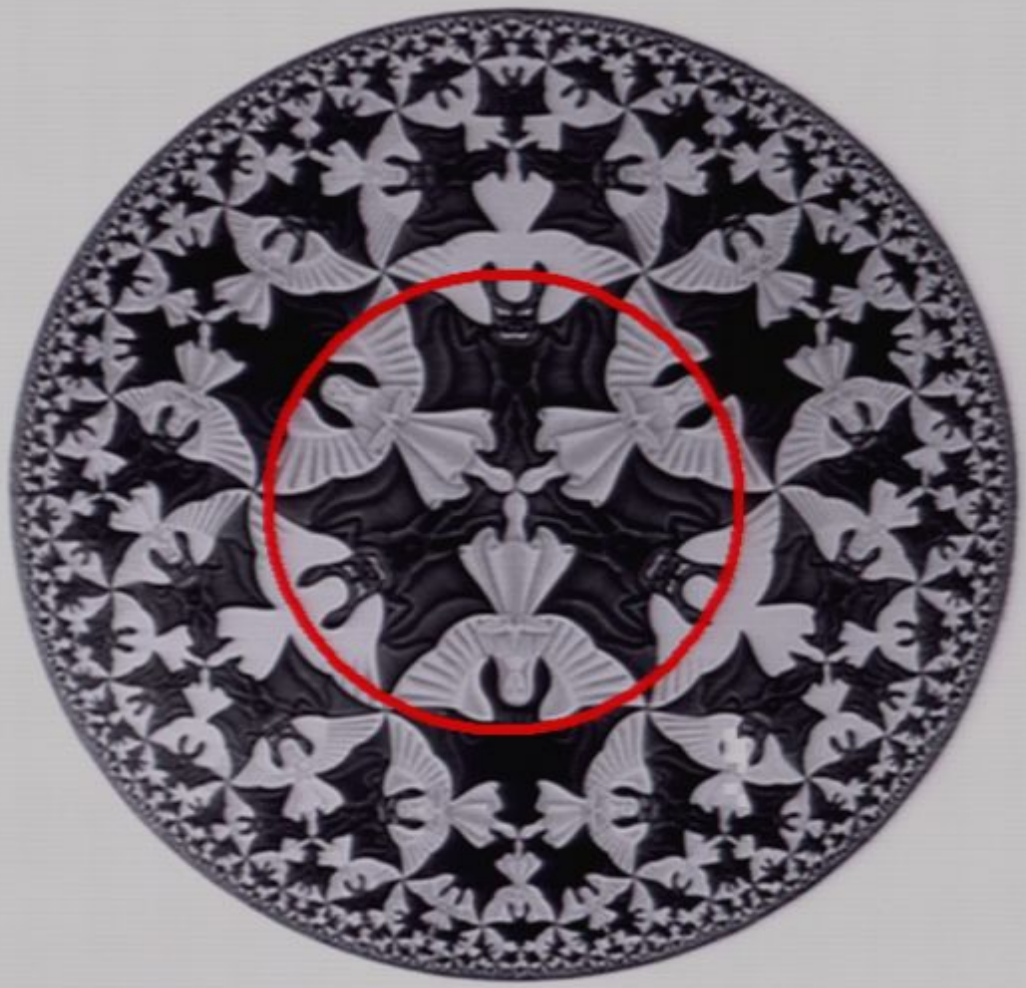


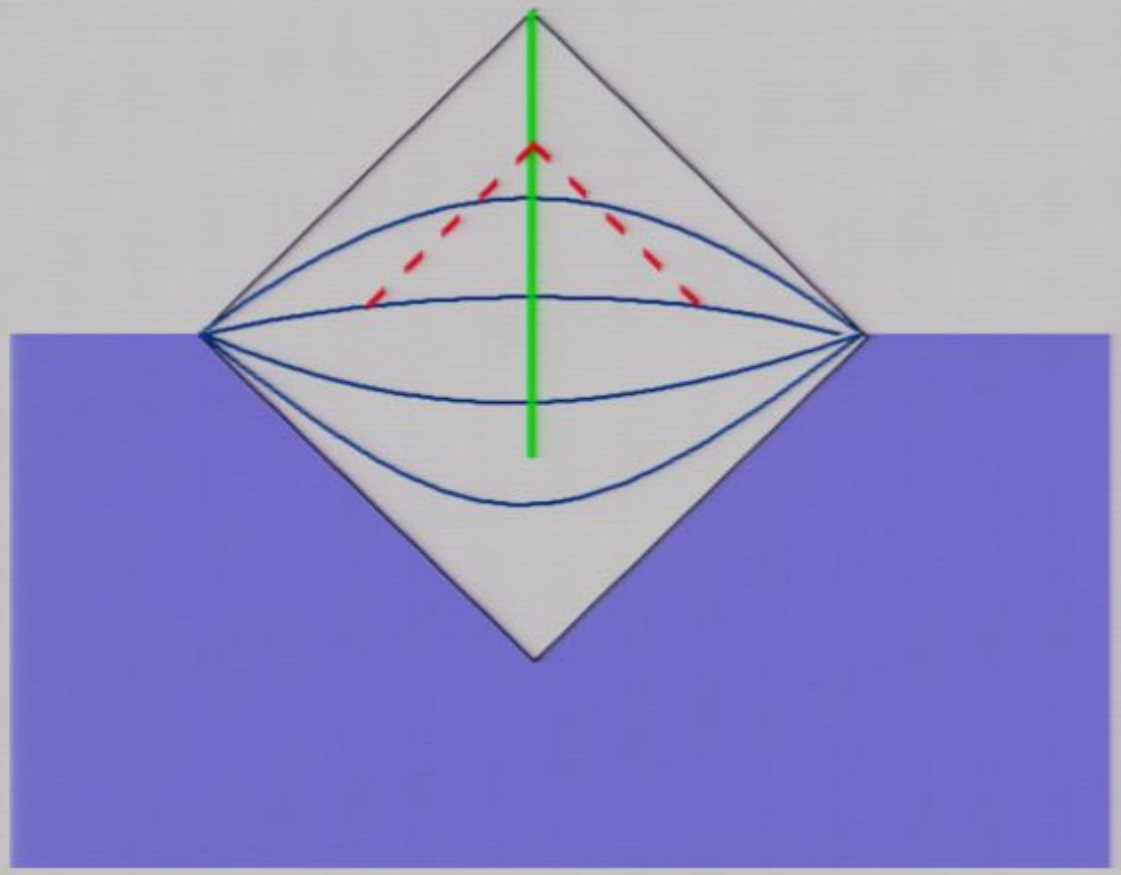
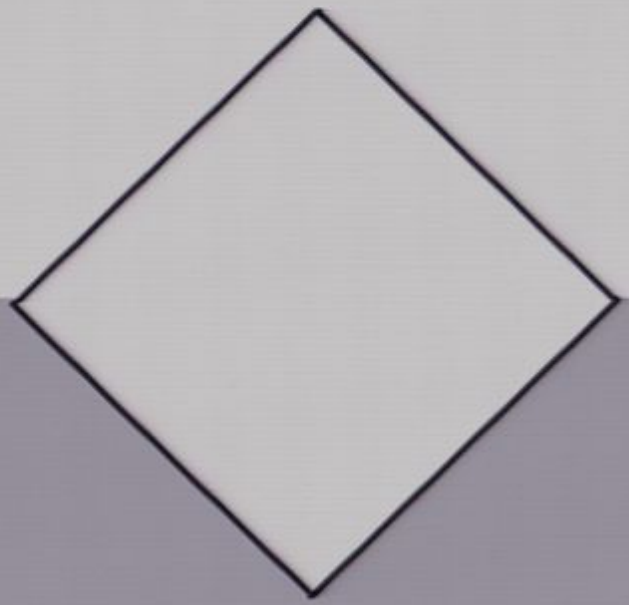
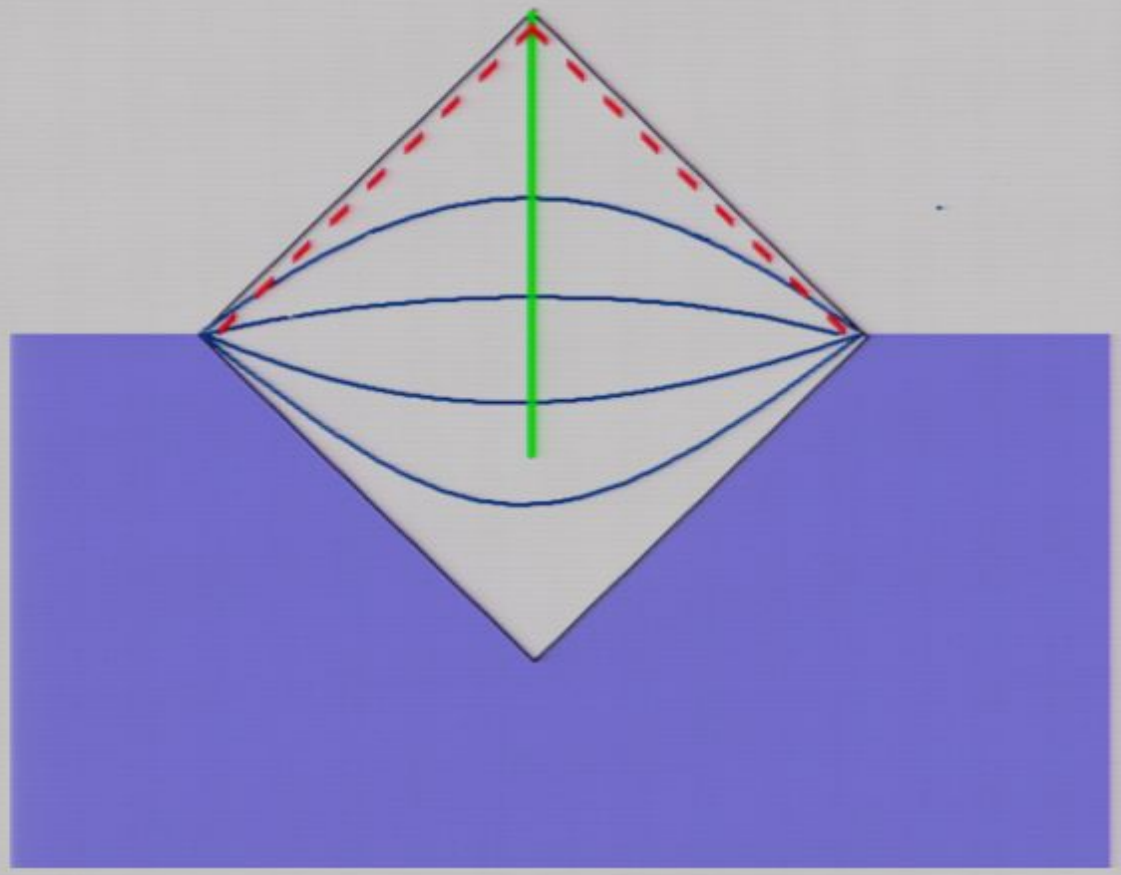
Positive

Tradition suggests positive curvature.

Eternal inflation + bubble nucleation requires negative curvature!

Negative



$N_e = 61$

$N_e = 64$